

FREE PLAN INSIDE »

Combat Me 109

MODEL **Airplane** NEWS

35 TOP PICKS

for the
Holidays

PLUS
**BEST
OUT OF THE
BOX**

6 Ready-to-Fly
Favorites

TESTED

Hangar 9
ShowTime 4D

Alfa Models
F-86 Sabre Jet

Century Helicopter
Hawk Pro

Morris Hobbies
Electric Su-Do-Khoi



Great Planes
Giant U-Can-Do
3D ARF



BIG Li-POLY POWER

FMA Direct
Skyvolt

Lights...
Camera...
Action!

**SHOOT ONBOARD VIDEO
WITH THIS EASY SETUP p. 76**

December 2005

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- View more action shots from Warbirds over Delaware
- Print the full-size plan of the Micro RC Aeronca Champ
- See the airborne video from Lights ... Camera ... Action!



BY DEBRA CLEGHORN



Works of Art

YOU MIGHT NOT THINK of yourself as an artist, but each time you design a covering scheme for your latest aerobat, replicate the details of a full-size warbird, or even simply add decals, checkerboards and stripes to your model, you're creating a work of art. And when you fly your model, you turn it into performance art. A freestyle aerobatic performance is a work of art, and so is a Cub flying a graceful figure-8 over the field.

This month, we offer two articles to spark both facets of your artistic creativity. Scale enthusiasts will appreciate guest "Scale Techniques" columnist Tom Polapink's insider tips on how to design, mold, assemble and paint realistic dummy engines. Apply this technique to your next WW I model, and you'll be a step closer to the winners' circle in the next scale competition you enter! In the performing-arts arena, senior tech editor Gerry Yarrish shows how he attached a wireless video camera to his plane for a bird's-eye view during flight. The possibilities for using this inexpensive add-on are endless; check out "Lights ... Camera ... Action!" on page 76, and see how easy it can be to make your own RC movie.

In this month's "Micro RC," Roger Carignan details how he added a motor and RC to a Guillois rubber-powered Aeronca Champ. When equipped with a small M-20 geared motor and magnetic actuators, the little Champ is an excellent flyer indoors and can also handle a light breeze.

Ever since Li-poly batteries first hit the modeling scene a few years ago, modelers and manufacturers have been finding better and more efficient ways to use this new technology. Now FMA Direct has introduced Skyvolt—a new Li-poly battery and

charging system that makes using Li-polys easier and more accessible in .40 to .60 (and larger) planes. Get the scoop from electrics veteran Bob Aberle on page 58.

Not so long ago, many serious modelers relegated ready-to-fly (RTF) planes to the "toy-trainer" category. Now, however, with no assembly required, these "charge-and-fly" models offer outstanding performance that will satisfy even the most experienced pilots. Check out our "Best out of the Box" feature on page 128 to see which planes the editors chose as their top six RTF electrics.

'Tis the season to be merry, and this month, we've made it even easier to find the gifts that you really want under your tree. Check out our 8-page special feature, "What's Hot for the Holidays"; it's filled with RC goodies—everything from the top ARFs we've reviewed this year to great gadgets and tools that make building and flying easier and more enjoyable. Here's a hint: photocopy the pages that show the gifts you want, and leave them someplace conspicuous. Trust us; your friends and family will appreciate knowing exactly how to please you.

Safe landings, and the best to you and yours in 2006.

Debra Cleghorn

Executive Editor



Bill Steffes' P-51 Mustang comes in for a landing at the Warbirds over Delaware event.

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Jon Chappell

EDITORIAL

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[AirWaves]

STEARMAN STORY

I have checked the CG and the balance of my Great Planes PT-17 Stearman ARF, but whenever I fly it, it requires a lot of down-elevator trim for level flight. I'm guessing that the problem is the engine's downthrust angle. Since you reviewed this airplane in the November issue, can you shed some light on the problem? Thanks!

BOB WILSON, SARASOTA, FL

Bob, the Stearman's downthrust is set by the firewall, so if you've installed your engine properly, I doubt that that is the problem. I installed an O.S. 1.20 4-stroke and moved my battery pack into the weight box that's attached to the top of the firewall. I bet you are on the tail-heavy side of things. Recheck your balance point, and make sure that it is 5½ inches back from the top wing's leading edge. My model required no lead to balance properly.

Also, I trim my model for cruise at slightly above ½ throttle, and the trim is fine. If you are trimming for straight and level at full power, this, too, could make your model require more down-trim. Hope this helps.

—GY

FOLDED WINGS

After reading the "Top Gun 2005" article in the September issue, I wonder if you could direct me to someone who can tell me how to successfully integrate folding wings into a Corsair. I asked around at the Toledo Weak Signals Model Expo in April, but no one had any information on how to make folding wings that unfold and lock into place for flight.

PAUL BREHA [EMAIL]

Interesting question, Paul. Folding wings for scale RC models have been discussed and attempted many times, but only a



few have been properly—and safely—executed. Nick Zirola Jr. built one of the most successful of these models: a Grumman TBM Avenger. It incorporated an impressive pneumatic system to lock and unlock the wing mechanism and to fold and extend the wings. (They folded in and back.) Nick flew this model for several

Mayhem 40 ARF

Specifications:

Wing Span: 54.5 inches (1384 mm)
Wing Area: 746 sq. inches (48.1 dm²)
Fuse Length: 49.5 inches (1257 mm)
Flying Weight: 4.5 to 5 pounds (2040 to 2270 g)
Engine Required: .40 - .46 2-Stroke (6.5 - 7.5 cm³)
.52 - .70 4-Stroke (8.5 - 11.5 cm³)
Radio Required: 4 channel with 5 servos
Order No.: SIGRC98ARF

*\$169.99 at Participating Dealers

3D Mayhem ARF

Specifications:

Wing Span: 72.125 inches (1832 mm)
Wing Area: 1167 sq. inches (75.3 dm²)
Fuse Length: 59 inches (1500 mm)
Flying Weight: 7 to 8 pounds (3175 to 3630 g)
Engine Required: .72 - .91 2-Stroke (11.8 - 15 cm³)
.72 - 1.20 4-Stroke (11.8 - 20 cm³)
Radio Required: 4 channel with 5 servos
Order No.: SIGRC79ARF

*\$209.99 at Participating Dealers

3-D TO THE X-TREME!



SIG Manufacturing Company, Inc.
P.O. Box 520 • Montezuma, Iowa 50171-0520
Web Site: www.sigmfg.com • Phone: (641)623-5154

years and never had a problem with the wing fold/lock design. You could discuss the details with him further if you like; write to him at Nick Zirol Plans, 29 Edgar Dr., Smithtown, NY 11787; zirolplans.com. Good luck with your folding-wing quest! —GY

ELECTRIC WARTHOG

First, thank you for the excellent magazines (*Model Airplane News* and *Backyard Flyer*). I have been a subscriber to *Model Airplane News* since the early '90s and have gotten *Backyard Flyer* since its debut. Both are awesome! I've been interested mainly in electrics—even before electrics were cool. When I was first learning to fly with my Goldberg Electra and a Mirage 550, the guys at the field laughed at my planes. In those days, flight times were short and lacked performance capabilities. It's nice to see all the improvements in this branch of the hobby.

I recently found a pullout plan; could you tell me in which issue it appeared? It's John Kidd's A-10 powered by two .051s (plan no. FSP08921). I was planning to do this in electric power. I was hoping to find the construction article for this aircraft in my back issues. Thanks for your help.

DEAN MOBERG [EMAIL]

You're in luck, Dean: those plans first appeared in Model Airplane News in August 1992. Good luck with your conversion, and I hope you'll send in a photo of your finished Warthog for "Pilot Projects." —DC

WING MFG. ACCESSORIES

I would like to point out that the info in your source guide needs to be corrected. In the Kondor Model Products B-25 review in the October 2005 issue of *Model Airplane News*, the author noted that he used Wing Mfg. machine guns and other scale accessories. Our new contact information is (269) 665-9630; wingmfg.com. I hope you can correct this error.

DAN GIPE, WING MFG. [EMAIL]

Consider it done, Dan. We have changed our source guide information and apologize for any inconvenience this may have caused. —GY

MILITARY INSIGNIA

I am looking for some military decals and/or stickers in pairs (stars and stripes), from 2 to

5 inches wide. They need to withstand outdoor weather (I want to use them for big RC planes). I can't seem to find these locally. Can you help?

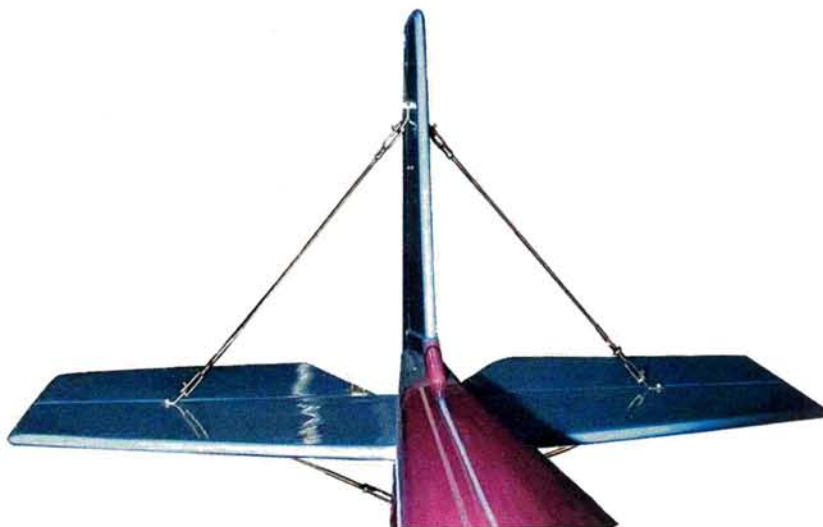
DANIEL WALENTOWSKI [EMAIL]

Daniel, you're in luck. There are several excellent suppliers of custom and standard aircraft markings, and their products are available in various sizes. We have had excellent results and good service from Cajun RC (337) 269-5177; cajunrc.com. The company's Scale Masters

premium vinyl graphics are available for dozens of military and civilian aircraft, and they are very easy to apply wet or dry. The markings are very thin and hold up quite well to UV rays and high temperatures. Best of all, they look as though they're painted on. —GY

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; email man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

High Strung.



The S546 Flying Wire Kit.

This kit is specified by major kit manufacturers for a reason: It is the most complete Flying Wire/Tail Brace Wire kit you can buy. It contains eight feet of *both* .032" Stainless Steel Cable and Heavy Duty Kevlar®. It has Gold-N-Clevises, eyebolts, crimp sleeves, nuts, Steel Brackets, couplers -- everything needed for a complete circuit around the tail or between wings in any of a dozen variations.

The kit is easy to install and adjust, whether you use the lightweight, nonconductive Kevlar® or the multistrand Cable.



Features special Steel Attachment Brackets. They can be bent as needed, will accept clevises in the small holes, or wire or Kevlar® loops through the brass bushing. (Available separately as S547).

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GETTING BETTER IDEAS OFF THE GROUND

[Tips & Tricks]

ILLUSTRATIONS BY RICHARD THOMPSON



Easy wheel chock

These inexpensive, easy-to-make wheel chocks will prevent your airplane from moving when it's being transported and when it's at the field. Cut a length of split-foam pipe insulation (found at any home-improvement center), and cut away the material on either side of the slit to fit your airplane's tire. A wire tie at each end will keep the wheel secure.

Bill Pettit, Saratoga Springs, NY

Only the shadow knows

Accurately aligning the horizontal stabilizer with the wings is critical if your model is to fly well, but their shapes may make such alignment difficult to achieve. By projecting a shadow of your completed model onto a light-colored wall, you can take measurements from the image. How? Put the model on a table, and position a desk lamp directly in front of it. The model and lamp may need to be moved around a bit to achieve the best image.

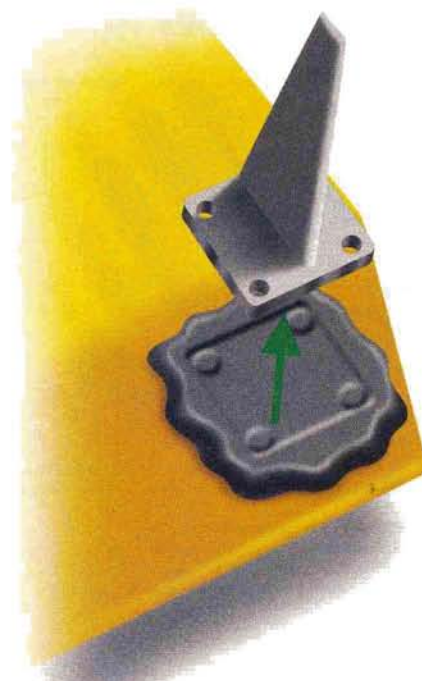
Rafael Piriz, Montevideo, Uruguay



Short-proof plugs

With the proliferation of high-current Li-poly battery packs, the possibility of a pack's shorting and causing a fire concerns many modelers. To protect the pack's plug from shorting when it isn't being used, buy a length of clear poly tubing from a home-improvement center. To determine the tubing diameter you need for your pack, take it to the store and use trial and error. Squeeze the tubing before you try the plug, and when the tubing relaxes, it should fit the plug snugly. Cut a short piece of dowel, glue it into one end of the tubing with CA, and your plug will be short-proof.

Duie Matenkosky, Jeannette, PA



Accurate control-horn installation

Installing control horns is tedious. The screw holes never seem to end up in the right places. To position the holes correctly, flatten some picture putty, put it on the control horn, and firmly push it onto the control surface until it sticks. Now you can accurately drill the pilot holes. Last, remove the control horn, and drill the holes to their final size.

Gary L. Orth, Mayetta, KS ✈

SEND IN YOUR IDEAS!

Model Airplane News will give a free, one-year subscription (or a one-year renewal, if you already subscribe) for each idea used in "Tips & Tricks." Send a rough sketch and a brief description to Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE THAT YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SUBMISSION. Because of the number of ideas we receive, we can neither acknowledge each one nor return unused material.

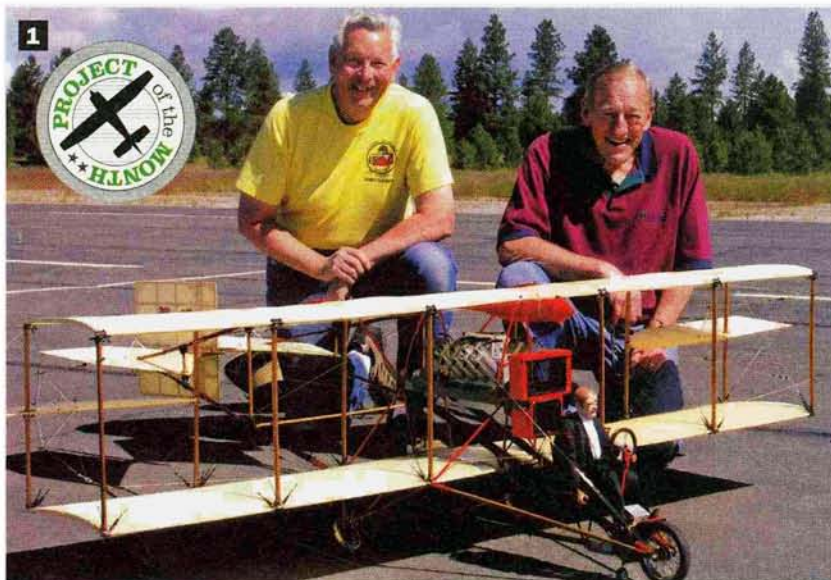
[PilotProjects]

1 Curtiss Headless Pusher

Dick Sudermann, Spokane, WA

This 1/4-scale Pusher, constructed by Dick Sudermann (right), was built from George Marsdon's plans and documents collected from the Smithsonian Air and Space Museum.

Sporting an 80-inch wingspan and a weight of 13 pounds, this Pusher is made of lite-ply, basswood and maple. It is covered in Solartex and is "very stable" in the air, according to Dick. He modified his plane by moving the engine from the back to the front, reasoning that it would work better. After six flights with the help of his friend and pilot, Ray Care (left), Dick writes that his Curtiss Headless Pusher is "... not too difficult to fly, and it has been a fun project."



2 Top Flite F4U Corsair

Ken Juneau, Friendswood, TX

After one full year of construction, Ken's Corsair is the first fabric/dope finish he has ever attempted. He powers his 10.8-pound model with a Magnum .92 4-stroke engine, a 14-ounce fuel tank, a Futaba radio and receiver, Hitec servos and the modified addition of Robart retracts. It has fully functional split flaps, an onboard glow igniter and a detailed cockpit and cowl baffle. Ken covered his Corsair with fabric and finished it with Sig dope. He admits that "The building process was quite complicated and time-consuming, but the finish is well worth the effort!"



3 Balsa USA Sopwith Pup

Jerry Kraft, Oregon City, OR

Purchased at a local auction, Jerry's Sopwith needed quite a bit of work. After reinforcing and rehinging parts of the body, he added a Zenoah .62 engine and a 22x10 Zinger propeller, and he covered his Pup with MonoKote and vinyl decals. The Sopwith has a 108-inch wingspan, is 80 inches long and weighs 25 pounds. Jerry says, "It flies very docilely and lands easily. It's a real crowd-pleaser!"



SEND IN YOUR SNAPSHOTS!

Model Airplane News is your magazine, and we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Color slides and color prints are acceptable, but please do not send digital printouts or Polaroid prints. Emailed submissions must be at least 300dpi. We receive so many photographs that we are unable to return them. Each month, one pilot's project will be selected as the "Project of the Month" and will be eligible for a grand prize of \$500, to be awarded at the end of the year. The winner will be chosen from among the published "Project of the Month" selections. Send entries to "Pilot Projects," Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

4 Lockheed C-130 Hercules

Ron Opland, Newton, KS

Scratch-built from plans published in the December 1981 issue of *Model Airplane News*, this C-130's body is formed out of balsa and fiberglass-covered foam. It is powered by four O.S. .20 motors with four 10x4 Taipan props and controlled with a JR radio. Over the course of 14 years, Ron has perfected his 20-pound, 12-ounce C-130. His model has a 101-inch wingspan, and it has been modified to omit the flaps. The great-looking finish is achieved with Rustoleum paint.



5 Top Flite P47D Thunderbolt

Robert Lloyd, Woodbury Heights, NJ

Robert, who has more than 70 years of modeling experience, tells us that this Top Flite P47D was "... a pleasure to build!" He powers his Thunderbolt with a SuperTigre G90 engine and a JR103 radio. The 8-pound P47D took three months to build, and Robert modified it slightly by substituting 2 servos on the ailerons for the bellcrank setup shown in the plans. He also configured a full cockpit interior and covered it with UltraCote.



6 Aeromaster "AMOS"

Ronald Wilson, Harrington, DE

This colorful Aeromaster has a wingspan of 57 inches and a 57-inch fuselage, and it weighs 12 pounds. Ronald powers his plane with an O.S. 1.20 engine with a 15x8-inch wooden prop and controls it with a Futaba 6-channel radio. Other features include a homemade fiberglass cowl and wheel pants, and it's capable of dropping three bombs. How does it fly? Ronald explains, "In flight, it was somewhat tail-heavy, so I had to 'down-trim.' Now, it flies great with a straight takeoff and smooth climbout." Ronald's "AMOS" is covered with 18 shades of Rustoleum paint.



7 SE5a Scout

Matthew Klein, Beachwood, OH

After finding plans for his SE5a in *Model Airplane News*, it took Matthew nine months to scratch-build this 1/4-scale model. It has a 71-inch wingspan and weighs 14 pounds. Matthew powers his Scout with a Futaba radio and a YS 1.20 SC 4-stroke engine. It is constructed out of balsa and plywood and is covered with Top Flite MonoKote. Matthew says that it is a "terrific flyer!" ✈



AirScoop

WHAT'S HOT AND WHERE TO GET IT

GREAT PLANES MODEL MFG.

ULTIMATE BIPLANE

Whether you're looking for an exciting sport flyer or over-the-top aerobatics, this giant-scale biplane aims to please. It features high-quality construction, painted fiberglass parts and MonoKote covering. Engineered and built to have an excellent power-to-weight ratio for outstanding 3D performance, the Ultimate is also designed for each of its four ailerons to be actuated by its own servo for maximum performance, and its light, strong, airfoil-shaped landing gear resists spreading during not-so-gentle landings. A spinner and complete hardware package are included. Specs: wingspan, 65 in.; wing area, 1,446 sq. in.; weight, 12.5 lb.; wing loading, 20 oz./sq. ft.; length, 72 in. Ideally powered by an O.S. 1.60, the Ultimate can also be equipped with a gas engine (up to 50cc); it also needs a 4- to 7-channel radio with 8 or 9 servos. The Ultimate Biplane costs \$550.

GREAT PLANES MODEL MFG. (217) 398-6300; (800) 682-8948; greatplanes.com.



CARL GOLDBERG PRODUCTS

PIPER CUBS & FLOATS

Available in classic Cub Yellow and in a red-white-and-blue motif, these .40 ARF Piper Cubs offer the excellent quality and craftsmanship that Carl Goldberg models are known for. Each has a built-up fuselage and wing, a fiberglass cowl and dummy engine and iron-on covering. A generous hardware package includes wheels, tailwheel assembly, wing struts, engine mount and fuel tank. Specs: wingspan, 76.5 in.; wing area, 744 sq. in.; weight, 7.5 lb.; length, 48 in. The Cub requires a .50 to .61 2-stroke or .46 to .90 4-stroke and a 4-channel radio with 5 servos.

Add Carl Goldberg Products prebuilt wooden floats for exciting water takeoffs and landings. Strong and lightweight with high-quality covering, they're a perfect match for Goldberg's Piper Cub ARF.

CARL GOLDBERG PRODUCTS (678) 450-0085; carlgoldbergproducts.com.



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MANUAL SERVO ADJUSTER

This tiny servo adjuster allows you to connect 1 or 2 servos for centering or testing without the use of a receiver and transmitter. Connect any 4- or 5-cell receiver pack for power, plug in your servo(s) and rotate the knob to test the travel; then return the knob to the middle to center your servo(s). The Manual Servo Adjuster costs \$10 and weighs just 8 grams.

HOBBY LOBBY INTL. (615) 373-1444; hobby-lobby.com.

KYOSHO CORP. OF AMERICA

CALIBER 5

Designed to please pilots of all skill levels, this machine is tame enough for novices but has more than enough responsiveness and power for 3D aerobatics. With its light, 30-size airframe and the big power of a .50 engine, the Caliber 5 delivers exceptional performance. It comes with an easy-to-adjust mechanical mixing system (MMS) for budget-minded pilots as well as a fixed radio plate to take advantage of electronic mixing (EMS) with a digital radio. The Caliber 5 includes carbon main rotor blades, carbon main rotors with a gelcoat finish, push-pull linkages for aileron, elevator and pitch control, a resin monocoque frame, precision ball bearings, an 80cc sub-fuel tank and a semi-assembled main frame and tail boom. Specs: length, 56.67 in.; height, 15.75 in.; main rotor, 52.76 in.; radio req'd, 6-channel w/5 servos and gyro.

KYOSHO CORP. OF AMERICA

(949) 454-8854; kyoshoamerica.com.



K&A MODELS

OV-10 BRONCO

With its scale looks and sport performance, this Speed 400 model captures the spirit of the OV-10 Bronco. The kit features fiberglass and foam construction and comes with many vacuum-formed accessories such as gun sponsons and assorted blisters. The wings come sheeted, and the fiberglass booms and center fuselage come primed in gray for an easy finish. This 42.5-inch-span OV-10 has a wing area of 335 square inches and weighs 42 to 46 ounces ready to fly. It requires a 4-channel radio with 4 servos and two Speed 400 or small brushless motors. The kit costs \$190 (plus \$14 S&H).

K&A MODELS UNLIMITED (505) 994-8083; kamodels.com.

FUN FORCE

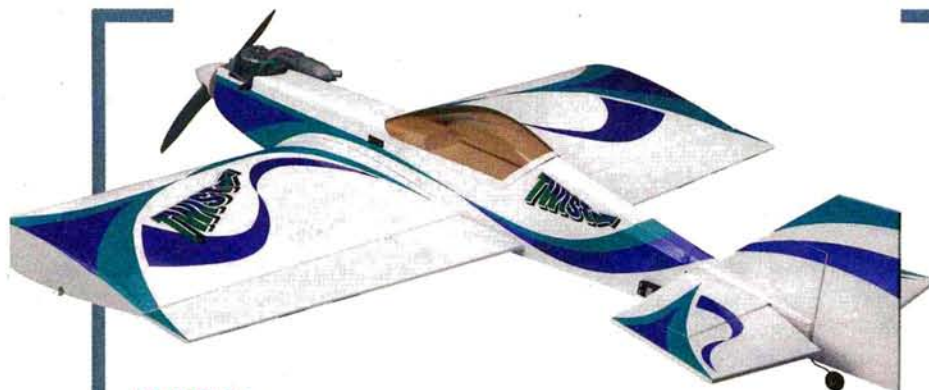
SPORT COMBAT FOAM AIRS

Durable enough to survive daunting dogfights and spirited sport flying, these foam fighters can be flight-ready in just a few hours. They're made of EPS foam with carbon-fiber tubes for strength and come with a Speed Force 370 geared motor, prop and prop saver. They require a 4-channel radio with 3 microservos and a micro-receiver, 6- and 12-inch servo extensions, a 20A ESC and a 1250 to 1500mAh, 3-cell Li-poly pack. The sport-scale trim scheme is already applied, and a complete hardware package is included. Both the P-51 Mustang and the FW-190 Focke-Wulf have a 33½-inch wingspan and 301 square inches of wing area, and they weigh about 14 ounces. Each costs \$90.

FUN FORCE; distributed by Great Planes Model Distributors

(217) 398-6300; (800) 682-8948; greatplanes.com.





HANGAR 9

TWIST .46 3D PLUG-N-PLAY

The Hangar 9 Twist 3D has a well-deserved reputation for all-out aerobatic performance, and now, it can be field-ready in minutes! The Twist 3D Plug-N-Play comes with an Evolution 46NT engine and 5 servos installed, so you need only plug in your receiver, bolt on your prop and take off! Bolt-together assembly means that no gluing is necessary, and the linkages are installed and adjusted at the factory. Just install your receiver and propeller, and you're ready for action. The Twist .46 3D Plug-N-Play costs \$350.

HANGAR 9; distributed by Horizon Hobby (217) 352-1913; horizonhobby.com.



HOBBY LOBBY INTL.

PROFESSIONAL VARIABLE PROP

With the Model Motors 9½-inch-diameter Professional Variable Propeller from Hobby Lobby, you'll be able to do insane 3D aerobatics! This unit comes assembled; you need only attach the blades and install the unit on a hollow-shaft Axi motor. It's ideally suited to a lightweight foam airframe that's powered by the EVP2208/34 motor with 3 Li-poly cells or by the EVP2208/20 with 2 Li-poly cells. The prop features a ball-bearing-mounted carbon rod that's attached to an additional servo to control blade pitch. The blades have a symmetrical airfoil and produce very strong brake/reverse action, but they retain conventional prop performance when in positive pitch. The Professional Variable Prop costs \$47.

HOBBY LOBBY INTL. (615) 373-1444; hobby-lobby.com.



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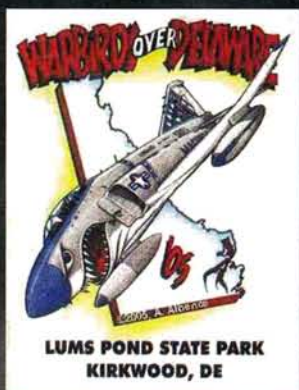
HOBBYZONE; distributed by Horizon Hobby Inc. (217) 352-1913; horizonhobby.com. ✈

Warbir over Delaware

The tradition of
excellence continues

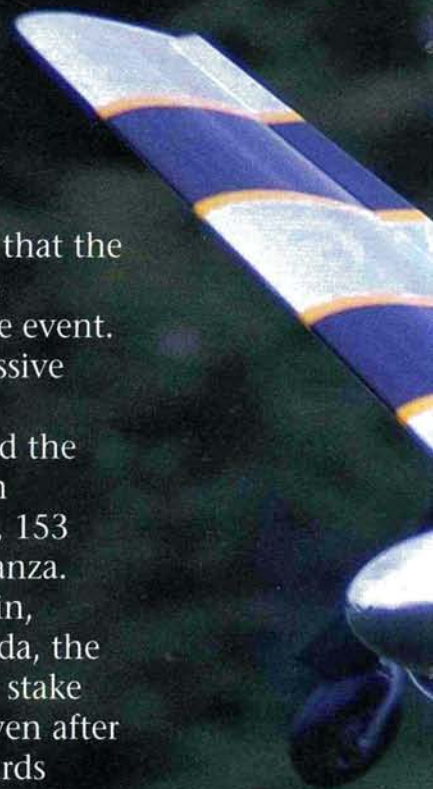
TEXT & PHOTOS BY GERRY YARRISH

Most lovers of giant-scale warbirds know that the first weekend after the Fourth of July is reserved for the Warbirds over Delaware event. Held at the Delaware R/C Club's impressive flying site at Lums Pond State Park in Kirkwood, DE, this year's outing marked the gathering's 14th anniversary. Even with Tropical Storm Cindy threatening to soak the entire East Coast, 153 intrepid pilots from 16 states showed up to enjoy the extravaganza.



Traveling from as far away as Wisconsin, Illinois, Vermont, Florida and even Canada, the troops start heading in on Wednesday to stake out their bases of operations. As usual, even after the event was officially over, many diehards remained and continued to fly late into Sunday afternoon. Except for early Friday morning, when there was a brief downpour, the entire weekend was picture-perfect.

Talk about being inspired to finish your military modeling projects! Nearly every era of aerial warfare was represented. From WW I and II to the Korean and Vietnam conflicts, biplanes, triplanes, observation aircraft, fighter planes and multi-engine bombers all took turns patrolling the skies. With commentary from announcer "Fast Eddie" Leuter, everyone was kept well informed about what was happening on the flightline—and who was to blame! Fast Eddie really earns his keep, as there's never a dull moment during the Warbirds weekend.



ds



Above: just a few of the tents on pit row. Below: Bill Steffes' P-51 comes in after a sortie. The $\frac{1}{5}$ -scale Mustang has a 101-inch span and is powered by a Fox 4.2cl.



Warbirds over Delaware

HEAVY-METAL HIGHLIGHTS

Contest directors Dave and Pete Malchione and many of the host club's members made everyone feel right at home and did a great job managing the flow of more than 300 giant-scale warbirds to and from the active runway. A stroll down pit row is a unique experience. Since it's an open fly-in and not a competition, there are endless opportunities to see the models up close and to speak with the pilots. All the usual suspects were in attendance, including Bob Walker of Robart, the Nick Zirolis (both senior and junior), Dennis Crooks of Indiana, Paul LeTourneau of Wisconsin and Illinoisans Carl Bachhuber and Merlyn Graves. The infamous Long Island gang was also there in force, led by the ever-cheerful and very helpful Sal Calvagna. The sheer number of warbirds that this active group brings to the event is always impressive; they cover the entire spectrum of fighting wings. From several 100-inch E.II Eindeckers, built from SR Batteries kits, to a German WW II rocket-equipped Me 163 Komet, built and flown by Kevin Shaw of Zombie Painted Pilots, and everything in between, this group has something for everyone—usually, in several sizes.

The monster-size aircraft brought by Carl, Merlyn and Paul redefined the term "giant aircraft"; these guys build enormous projects and fly them with precision and finesse. Last year, Paul flew a very impressive B-25 Mitchell bomber (featured in the "Final Approach" section of the October 2005 issue), and this year, he outdid himself with a 160-inch P-61 Black Widow (see the sidebar, "Paul's Black Widow"). Merlyn's Bristol Blenheim twin-engine fighter was a real showstopper, as was his 120-inch North American OV-10. Merlyn enlarged a set of Palmer Plans and powered the 1/4-scale Bronco with a pair of Fuji 64 gas engines. Unfortunately, the airplane was lost during the weekend.

For the ultimate in realism, though, I think Carl's 4-engine DC-6, the "Independence," powered by four Zenoah G-26 gas engines, stole the show. The full-size aircraft was President Harry S. Truman's transport and airborne White House. (See the November '05 "Final Approach.")

HALFTIME BREAK

The entertaining halftime show included something fast and something slow. "Fast" took the form of a Bob Violett Models F-100 turbine-powered jet piloted by Dave Malchione Jr. It attempted to break the scale

The monster-size aircraft brought by Carl, Merlyn and Paul redefined the term "giant aircraft"; these guys build enormous projects and fly them with precision and finesse.



Joseph Hanson's 1/4-scale Fokker Dr.I is done up in the Red Baron paint scheme and is powered by a G-26.



Zain Adam Rahore flew this impressive Balsa USA Sopwith Pup, powered by a GT-80 twin-cylinder gas engine.

Flown by Dave Malchione Jr., this impressive, 102-inch-span P-47 Thunderbolt Razorback is built from the Meister Scale kit.



Above: Team Skyraider in action! Nick Zirolis (far right) prepares to start his Sandy for another formation flight. Right: Kevin Shaw built this Me 163 Komet and installed a 1 1/2-inch solid rocket-fuel tube in its tail.



This 1/4-scale Fokker E.V. is the work of Robert Allen, who also installed a smoke system in the impressive "Flying Razor." Powered by a Quadra 35, the model has an 80-inch span.



Merlyn Graves' 120-inch OV-10 Bronco.



Merlyn also flew this 170-inch-span Bristol Blenheim bomber.



Dennis Crooks with his P-38 Lightning, built from Zirolli plans and powered by two 3.3ci engines.



John Kohler's smoke-equipped AT-6 Texan.



Paul's Black Widow

Paul LeTourneau continues his giant-scale quest for military perfection in the form of his newest Goliath: the P-61 Black Widow. With an impressive wingspan of 160 inches and a length of 108 inches, Paul's twin-engine night fighter is an enlarged version of the 1/5-scale P-61 plans by Nick Zirolli. Built in traditional balsa and plywood covered with fiberglass cloth and resin, the model is powered by two 100cc Desert Aircraft boxer twin-cylinder engines. The finished model weighs about 85 pounds, and special features include custom-made Robart retracts and wheels and brakes from Sierra Giant Scale. Paul uses a JR 10X radio to keep everything under control!

During the Warbird weekend at Lums Pond, Paul flew formation with Dennis Crooks, who piloted a Zirolli P-38 Lightning. "Impressive" doesn't begin to describe the sight and sounds of these two South Pacific classics as they buzzed the field.

Warbirds over Delaware

Larry Alles flew the pants off this beautiful, 93-inch-span F4U Corsair; it's powered by a 3W-60 engine.

Event Sponsors

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A full-size Stearman PT-17 biplane carrying the lucky raffle winner made a few low flybys.



sound barrier. Dave Jr. brought the Super Sabre—powered by a kerosene-burning JetCat turbine—down on the deck for some impressively low passes! The “slow” part of the show consisted of an all-yellow Piper NE-2 Grasshopper flown in a military version of the classic “crazy-farmer” routine! Piloted by Adam Lilly and narrated by Spamy McKay, the Cub in military dress flew very low and very slow and got itself into all sorts of unusual attitudes. Also during halftime, a full-size Stearman PT-17 biplane carrying the lucky raffle winner made a few low flybys. The grand finale was a pair of full-size Russian-made L-29 Delfin jets that made several high-speed passes. The sound that these surplus military jets made was awe-inspiring!

Anyone who has ever attended a warbird meet at Lums Pond is familiar with one special member of the Delaware County R/C Club. Carl Hauger played an important role in the operation of the club and was the man behind the scenes during the warbird event. Sadly, Carl passed away a few weeks



Carl Bachhuber's killer DC-6 is powered by four Zenoah G-26 engines.

before this year's extravaganza, and the 2005 meet was dedicated to his memory (as will be all future events). Officially renamed “Carl Hauger's Warbirds Over Delaware,” the event is again scheduled for the first weekend after the Fourth of July, 2006. Dave and Pete Malchione and all the hardworking club volunteers have pledged to continue the tradition of excellence. ✈

For more information, write to the Delaware R/C Club, 106 DeWalt Rd., Newark, DE 19711-7631, or visit delawarerc.org.

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Tom Perkins' 101-inch-span PYB Catalina flying boat was piloted by John Kohler.



Ron Liska lands his 1/4-scale MiG 3. The 101-inch-span fighter is powered by a ZDZ-80.




HANGAR 9

SHOWTIME

A plane with a wide range of attitudes!

When I first saw the ShowTime 4D, I was immediately impressed by its design and color scheme. But the Side Force Generators (SFG) that stuck out from each wing—what were those all about? I had a chance to talk with Mike McConville about this unusual design, and he explained how the SFG enable the plane to fly in a knife-edge attitude with stability and authority. The concept intrigued me, and I really hoped that I would be able to review the plane. For once, my luck held, so ... on with "the Show"!





“The ShowTime 4D
looks great and has
EXCELLENT FLIGHT
CHARACTERISTICS.”

SPECIFICATIONS

MODEL: ShowTime 4D

MANUFACTURER: Hangar 9

DISTRIBUTOR: Horizon Hobby Inc.

TYPE: sport aerobat

LENGTH: 68.3 in.

WINGSPAN: 66 in.

WING AREA: 900 sq. in.

WEIGHT: 8 lb. 9 oz.

WING LOADING: 21.9 oz./sq. ft.

ENGINE REQ'D: .61 to 1.00 2-stroke or .91 to 1.10 4-stroke

RADIO REQ'D: 4-channel w/6 servos

PRICE: \$260

HIGHLIGHTS

- Great-looking, unique design
- Outstanding flight performance
- Complete hardware package

TEST GEAR

RADIO: JR10X transmitter, R649S receiver, 5 JR 8411 servos, 1 NES 537 servo

ENGINE: Saito 100 GK

FUEL: Wildcat 15%

PROP: Pro Zinger 14x8



COMMENTS:

The ShowTime 4D is ideal for those who want a great aerobatic performer that is large enough to give the feel of an IMAC aircraft yet small enough to transport easily.



The short pushrod connections to the control surfaces provide a quick, solid control response. The rudder servo is placed farthest rearward; by using the alternative push-pull setup for the rudder, you avoid having to add any nose weight.

OPENING THE BOX

The plane arrives in a large, solid box with every major piece stored in an individual compartment. This box design worked quite well because the outside box was damaged in shipping, but not one piece of the plane was lost or broken.

The main components, fuselage, wings, stabilizers, rudder, canopy, cowl and landing gear are all sealed in their own plastic bags. The tailwheel, main wheels, fully assembled fuel tank and a complete, high-quality hardware package are also stowed separately. The well-written, photo-illustrated, 35-page manual guides you through the construction and includes tips and two motor-installation options.

ASSEMBLY

Before I started assembly, I used a covering iron set at 300 degrees to remove the wrinkles in the covering. A covering iron is the best choice for removing the wrinkles in an elaborate color scheme such as the ShowTime's because it provides precise heat and pressure control. A heat gun does

not provide such precise heat, and if misused, it will cause the trim color to shrink and lift. After had I removed all the wrinkles, I applied a few drops of thin CA to the points of the trim covering, gave them a quick wipe with a paper towel and sprayed the surface with accelerator. I've found that using CA on the tip of the trim covering prevents it from lifting, even after many hours of flying.

WING

I started assembly by hinging all the control surfaces—first the wing, then the elevator and the rudder. The ShowTime 4D has CA hinges. The main thing here is to be sure to glue the hinges so that they are tight and have no more than a 1/64-inch gap with full deflection movement. I used BSI Insta-Flex CA hinge glue for this.

Aileron-servo installation was next, and that was pretty straightforward. Using a weight tied to a string, I pulled the aileron-servo connector (with a 12-inch servo extension attached) through the wing and out through the wing root. I attached the



The hardware supplied with the kit is good-quality, heavy-duty equipment.



This little nut on the underside of the wing holds the SFG on. Unscrew it to remove the SFG and then pull out the wing's top and bottom panels.



In the Air

All of my test flights on the ShowTime were done with a Saito 100 GK running Wildcat 15-percent nitro with a Pro Zinger 14x8. This combination had plenty of power to perform all aerobatic maneuvers; however, I fly at 2,800 feet, and this combination had just enough power to hover the plane but not enough to allow a vertical pullout.

CONTROL THROWS:

- **ELEVATOR:** $\pm 4\frac{1}{4}$ in., expo: 60% (high); $\pm 2\frac{1}{2}$ in., expo: 35% (med.); $\pm \frac{5}{8}$ in., expo: 25% (low)
- **AILERON:** $\pm 3\frac{3}{4}$ in., expo: 60% (high); $\pm 2\frac{3}{4}$ in., expo: 50% (med.); ± 2 in., expo: 25% (low)
- **RUDDER:** $\pm 2\frac{1}{2}$ in., expo: 60% (high); ± 2 in., expo: 50% (med.); $\pm 1\frac{5}{8}$ in., expo: 35% (low)

GENERAL FLIGHT CHARACTERISTICS

- **STABILITY.** Outstanding! Slow or fast, on high or low rates—it makes no difference. This plane is a solid flying aircraft.
- **TRACKING.** On the ground, in the air, inverted, or knife-edge, this plane goes exactly where it's pointed with little or no deviation.
- **AEROBATICS.** The plane has nearly unlimited aerobatic capability and is really strong on any knife-edge maneuver.

- **GLIDE PERFORMANCE.** With the nose pointing downward slightly, the plane descends at a very controllable rate.

- **STALLS.** Induced stalls are pretty much straight ahead, and recovery to flying speed is quick. Applying full elevator (at high rates) will induce a slight tip-stall.

PILOT DEBRIEFING

The ShowTime 4D flies so well that its stability and performance mimic that of a much larger aircraft. Its aerobatic flight performance is outstanding, and the plane really feels solid throughout every maneuver. High- and low-speed aerobatics all reacted with solid control response. Knife-edge flight had minimal coupling issues and required only very slight rudder deflection. This plane can do a knife-edge loop like no other plane.

I flew the plane with and without the Side Force Generators (SFG) and noticed that the plane seemed to roll a bit slower, and knife-edge flight required a little more rudder deflection. When it is time to land the plane, the ShowTime 4D slows down to a crawl with solid control response, so it's very easy to land. Needless to say, I was extremely impressed by the ShowTime 4D's flight performance.

servo and hooked up the aileron linkage to the control surface. The aileron control horn is a long screw that you insert through the top of the aileron and then glue into place. Be sure to use plenty of epoxy to secure it because some of the holes are slightly larger than others. I'd rather have a solid control-horn bond and have to clean up the excess epoxy with rubbing alcohol than a weak bond that could fail during a flight. Connecting the linkage was a breeze because all of the pushrods are cut to the proper lengths.

TAIL FEATHERS

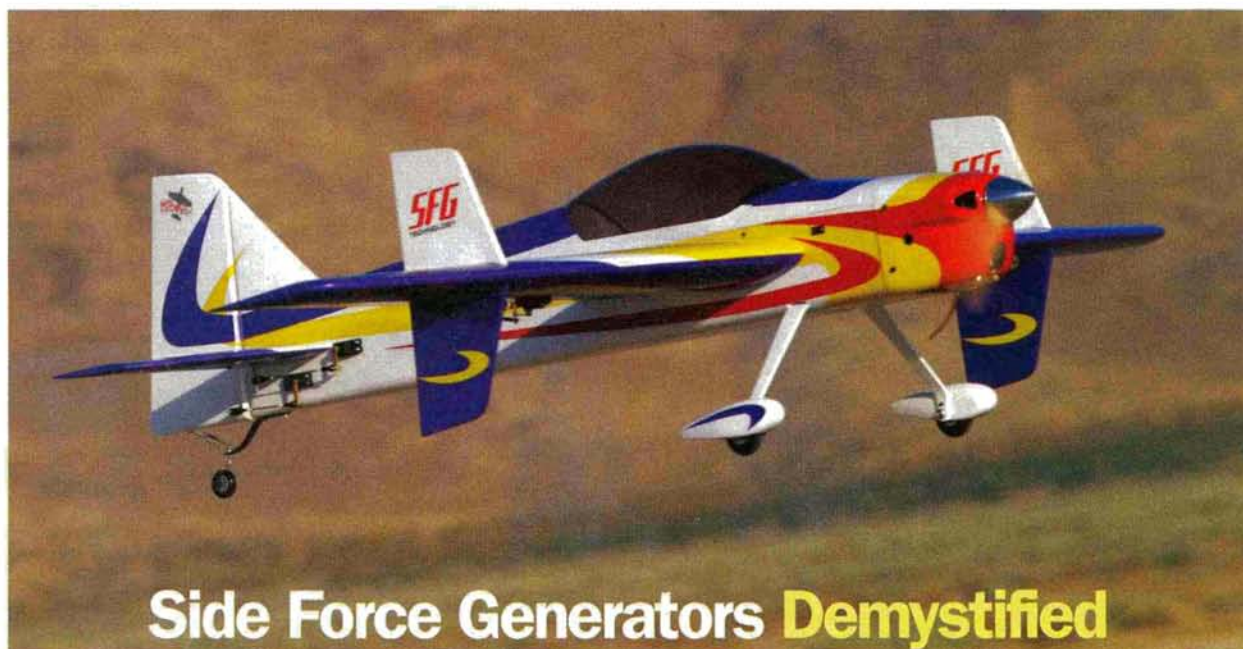
Joiner tubes connect the horizontal stabilizer and the wing to the fuselage. You simply have to slide the wing half onto the joiner tube so that the alignment pins slide into the holes in the fuselage; then secure both wing halves with $\frac{1}{4}$ x 20 nylon wing bolts.

To attach the horizontal stabilizer, insert the stabilizer tube into a hole at the back of the fuselage, center it, and mark where it exits. Insert the rod into one of the stabilizer halves up to the first line; then drill and tap a hole going into the tube through the bot-

tom of the stabilizer half. Use 4-40 bolts to fasten it to the tube. Reinstall this assembly on the fuselage, and attach the other stabilizer half in the same way. Attach the elevator servo and linkage in the same way as you attached the ailerons.

POWER SYSTEM

I decided to power the plane with a Saito 100 GK 4-stroke. I mounted the engine inverted, and the instructions include all the necessary measurements for proper installation. Then I marked the position of the throttle pushrod,



Side Force Generators Demystified

The ShowTime 4D's SFG look cool on the wings, but do they really help the plane fly better? Do they really enhance rudder authority? The quick and short answer is: yes, they do. The SFG are removable wing-mounted surfaces that improve the yaw force created by the rudder. Their position, size and shape generate lift in the yaw axis whenever the rudder is moved. With them on the wing, knife-edge flight requires almost no positive fuselage angle to maintain altitude. They even make very tight knife-edge loops possible, and control authority in hovering is also greatly improved.

Mike McConville credits the design of the SFG to his good

friend George Hicks, who created the design last year for an electric-powered foamie biplane that competed at the ETOC. After experimenting with various small foam monoplanes, they arrived at an SFG size that gave them the desired effect. Making them roughly 20 to 25 percent of the wing area gave the monoplanes the rudder authority they were looking for. Using those specifications, Mike McConville plugged the SFG into a larger plane that he designed a few years before, and the ShowTime 4D was born. As you can see, the SFG really aren't a new concept, but adding them to the wing of a monoplane to generate extreme rudder power is a new twist—and a design that works very well.

drilled through the firewall and installed it. The fuel tank comes completely assembled, and before I installed it, I looked at the tubes in the tank to determine which line was the vent and which was the clunk. I secured the fuel tank to the floor with the two supplied 13-inch zip-ties. I had to trim one of the engine-mount bolts so the tank would fit firmly against the firewall.

Because the tank sits higher than the carburetor on the Saito 100 GK, gravity feeds the fuel to the carburetor, and that causes the engine to flood before you can start it. I rectified this by using a Du-Bro Kwik-Fill fueling valve. By inserting a capped-off fuel probe into the fueling valve, I was able to prevent the fuel from flowing into the carburetor until I was ready to start the engine. Once started, the inverted Saito 100 GK ran perfectly.

RADIO GEAR AND FINAL ASSEMBLY

Depending on the size of the engine you select, there are two possible rudder servo



The ShowTime 4D is not a terribly large plane, but it has plenty of room for all the flight equipment.

positions: at the back of the fuselage and close to the rudder or in the front of the fuselage with a pull-pull system. I used the rear location for my rudder servo but found that I had to add 2 ounces of lead in the nose to balance the plane. I recommend that you use the pull-pull system so you won't need to add any weight to the nose.

I made appropriate cutouts in the cowl so that I could have access to the engine. Next, I installed the main landing gear with wheels and wheel pants; I used

thread-lock on the bolts and nuts to ensure that they would not vibrate loose. I installed the tailwheel, receiver, switch and flight battery and then glued the canopy on with RCZ56 canopy glue. Last, I attached the Side Force Generators, balanced the model and set all of my control throws to have low, medium and high rates. To start, I used the manufacturer's recommended low and high rates.

FINAL THOUGHTS

The ShowTime 4D looks great, is a unique design and has excellent flight characteristics. I flew the plane with the SFGs both on and off. The plane flies great either way, but the SFG add a dimension that no other plane I've flown has; it can perform knife-edge maneuvers unlike anything else out there. I want to fly this plane all the time, and I have no doubt that you will feel the same way! ✈

See the Source Guide on page 167 for manufacturers' contact information.



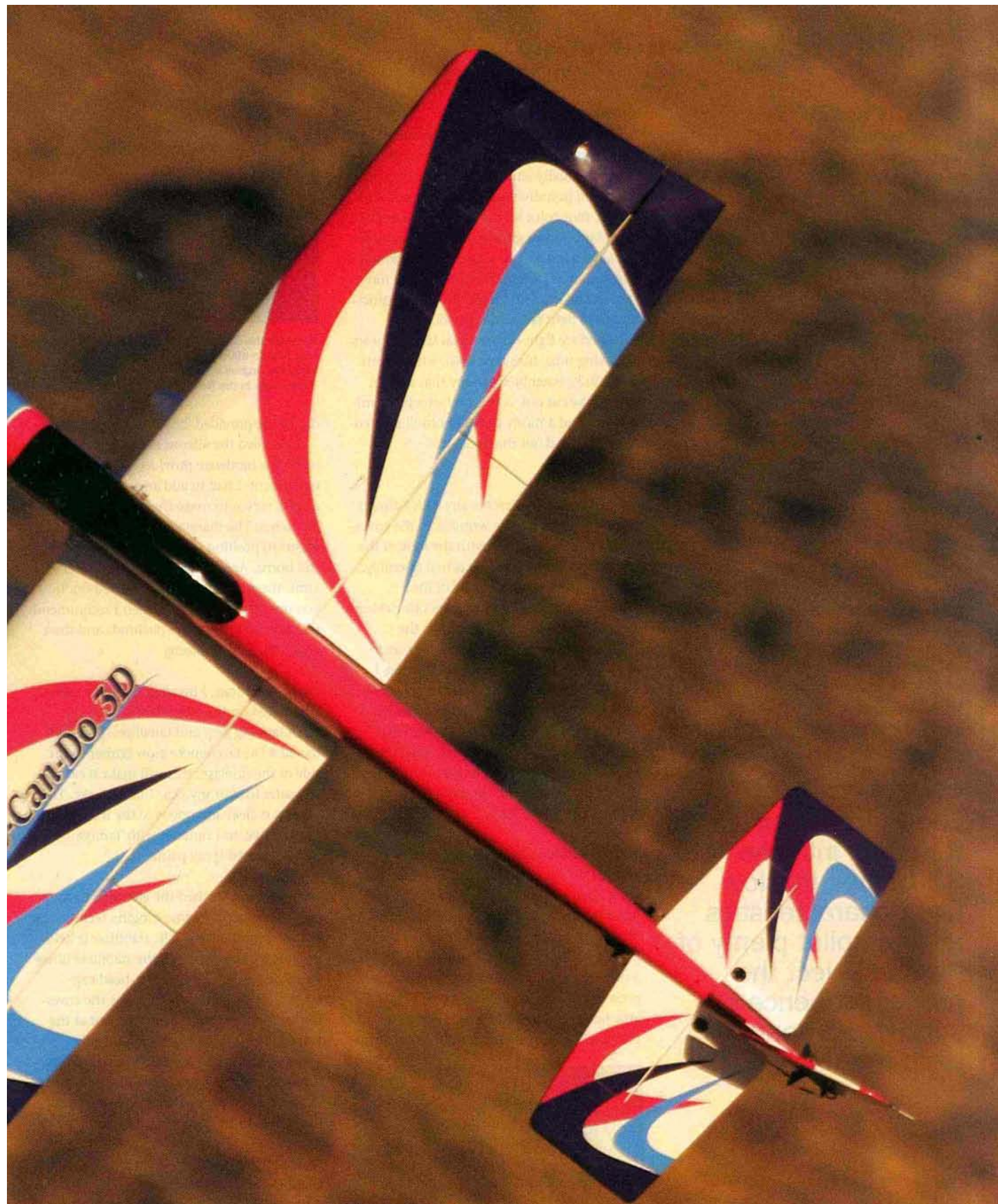
GREAT PLANES MODEL MFG.

GIANT U-CAN-DO 3D ARF

Super-size your aerobatics!

The U-Can-Do series from Great Planes has been very successful in getting RC pilots started in 3D aerobatics. These ARF models offer excellent stability and solid flying performance—a much needed combination for any type of aerobatic competition. The new Giant U-Can-Do 3D now makes this flying platform available for IMAC competition. With such a solid pedigree, the Giant U-Can-Do 3D seemed promising, and I looked forward to checking out what it could really do.





“The Giant U-Can-Do is capable of
SOME UNIQUE MANEUVERS ...”

SPECIFICATIONS

MODEL: Giant U-Can-Do 3D ARF

MANUFACTURER: Great Planes Model Mfg.

TYPE: 3D aerobatic ARF

LENGTH: 84 in.

WINGSPAN: 82 in.

WING AREA: 1,772 sq. in.

WEIGHT: 12.4 lb.

WING LOADING: 15.92 oz./sq. ft.

ENGINE REQ'D: 1.20 to 1.60 2-stroke, 2.0 to 2.5ci gas

RADIO REQ'D: 5-channel with 8 servos

PRICE: \$350

HIGHLIGHTS

- Solid construction and great parts fit
- Easy slow-flight characteristics
- Perfect for 3D flight

TEST GEAR

RADIO: Futaba 9CAP Super transmitter and 149DP receiver, 4 S9001, 3 S9206 and 1 S3003 Futaba servos

ENGINE: O.S. 1.60 FX 2-stroke

FUEL: PowerMaster 15%

PROP: APC 18x6W



COMMENTS

The Giant U-Can-Do is a perfect intermediate 3D trainer. Its slow flight characteristics give the pilot plenty of time to select the proper sequence of stick movements for each maneuver.

OPENING THE BOX

This large plane comes in (appropriately!) a very large box. All of the major components are individually wrapped in plastic bags and protected in individual compartments. The bright, four-color MonoKote scheme makes this plane almost glow in the box. Included are large wing halves, a fuselage, horizontal stabilizer and elevator, vertical fin and rudder, and ailerons and flaps. All are constructed out of light balsa and plywood. Also included are lightweight metal landing gears and wing tube, fiberglass cowl, wheel pants and a fully assembled canopy that did not need to be cut out. A very well-stocked hardware kit and a nicely done, photo-illustrated manual round out the package.

ASSEMBLY

Before I begin to assemble any ARF, I always begin by removing the wrinkles in the covering. When I'm satisfied with the look of the covering, I move on to the actual assembly.

The first step is to solder all of the pushrods. Both threaded and smooth clevises are included, and both will fit over the unthreaded end of the pushrods. Be sure to use the unthreaded clevises for soldering. I found that if you use the recommended 1¼-inch-long servo arms, the suggested pushrod lengths are a perfect fit. I recommend that you wait until you've connected the pushrods to the servos and control horns to cut and solder the pushrods so that you can make the appropriate adjustments.

Wing assembly I started wing assembly by gluing two nylon alignment dowels in each wing. These are a rather tight fit in the two holes in the wing, and if you hammer the dowels into place, you run the risk of breaking the backing support. I applied BSI 5-minute epoxy and used a small C-clamp to press the dowels into the root ribs. I then attached the flaps and ailerons using the provided CA hinges (you'll need to cut them



Because the engine fits so well under the cowl, I was able to make very close, precise cutouts. Keep the engine cool by cutting out a large air-intake hole in the front of the cowl.

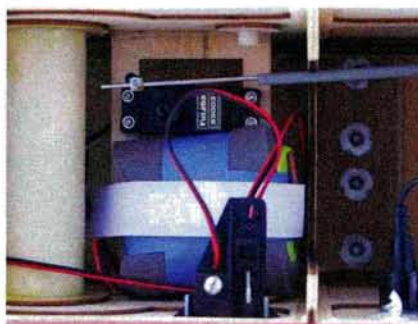
out of the provided 2x9-inch hinge strip).

I installed the aileron and flap servos using the hardware provided with my radio equipment. I had to add an extension to the aileron servos to make the total lead at least 30 inches. The manual provides measurements to position the aileron and flap control horns. Again, if you use 1¼-inch servo arms, these measurements are dead on. If you use other servo arms, then I recommend that you first install the pushrods and then attach the control horns.

Fuselage To start, I inserted the wing tube and bolted on the wing halves, then the main landing gear and tailwheel. I decided to add a Du-Bro remote glow igniter to the side of the fuselage; this will make it easier and safer to start my O.S. 1.60 2-stroke. The canopy is clear and opens to the inside of the fuselage, so I tinted it with Tamiya smoke-colored spray paint.

Tail feathers I attached the elevators to the stabilizer using the same hinging techniques as I used for the wing. The stabilizer is held in place by bolting it and the stabilizer fillet onto the fuselage with socket-head cap-screws. Mark the fin, and remove the covering on the part that fits into the slot at the rear of the fuselage. I applied 5-minute epoxy to the bare wood and placed it in the slot, keeping it perpendicular to the stabilizer until it had dried. The last step is to attach the rudder to the fin with CA hinges.

Engine installation I decided to power the Giant U-Can-Do 3D with an O.S. 1.60 FX 2-stroke. This engine is at the upper end of the recommended range and provides a good amount of power for this large bird. The manual instructs you to align the engine mount with the vertical centerline on the firewall, but my plane did not have that centerline. I attached the engine mount so that it was loose on the firewall. After attaching the O.S.



The throttle servo location is dictated by where the throttle pushrod ends up. Because there's only one servo on the tray, there was plenty of room to strap in the battery pack.

engine to the mount, I used the cowl to align the engine vertically (the engine was automatically aligned horizontally), then I tightened the firewall bolts.

I taped thin cardboard to the fuselage and made accurate templates of the cutouts that were needed in the cowl, then remounted the cowl and transferred the cutouts from the template. Using my Dremel tool, I made the necessary cutouts in the cowl so that I would have access to everything on the engine.

I installed the tank using a two-line system and inserted a Du-Bro Kwik-Fill fueling valve between the tank and the carburetor.

Radio and final assembly I installed one rudder and two elevator servos at the rear of the fuselage; each needs a 36-inch servo extension. The 1¼-inch servo arms provided the recommended throws for the control surfaces and allowed me to use all of the suggested control-horn placements and pushrod lengths. The throttle servo is inside the fuselage, and its position is dictated by the placement of the throttle pushrod. There is plenty of room inside the fuselage for all of the radio gear, and I positioned the battery and receiver to help balance the plane.

Guiding the receiver antenna down the antenna tube in the fuselage proved to be quite a challenge. I was able to accomplish this by inserting some graphite lubricant into the tube and then sliding in the antenna. I found a place for the switch harness and installed it.

I mounted the hatch to the fuselage using two 4-40 bolts and washers. To help prevent these bolts from vibrating loose, I cut small pieces of fuel tubing to act as vibration-damping washers and placed these on the 4-40 bolts. I balanced the plane and set the control surfaces to the recommended throw rates. Then I cut out and applied the decals. Now my plane was ready to go.

FINAL THOUGHTS

The Great Planes Giant U-Can-Do 3D is very easy to assemble, but I did not come close to the 6- to 8-hour assembly time stated on the box. I am, however, a rather meticulous builder and spent a lot of time on the details. I assembled the plane in about 20 hours.

The plane has outstanding flight performance and is very satisfying to fly. It's capable of some unique maneuvers! If you want a fun plane that can do just about anything, then the Great Planes Giant U-Can-Do 3D is for you. ✈

See the Source Guide on page 167 for manufacturers' contact information.



In the Air

The Giant U-Can-Do 3D balanced slightly nose-heavy—too conservative for my type of flying. Balancing the plane slightly tail-heavy gives it good control response but still allows it to be quite stable during straight flight. The O.S. 1.60 FX engine swinging an 18x6W APC prop provided more than enough power and got the Giant U-Can-Do 3D in the air within 60 feet. Once in the air, the plane required only three clicks of up-elevator trim. This plane can really slow down for landings—especially with the use of flaps. Because of its slow landing speed, I found that I was using the flaps for enhancing maneuvers more than slowing down the plane for landing.

CONTROL THROWS:

- **ELEVATOR:** ±5 in. (high), expo: -60%; ±1¾ in. (low); expo: -30%
- **AILERON:** ±2¾ in. (high), expo: -50%; ±1¼ in. (low); expo: -20%
- **RUDDER:** ±6 in. (high), expo: -50%; ±4 in. (low); expo: -20%

GENERAL FLIGHT CHARACTERISTICS

- **STABILITY.** This plane has outstanding stability. At any attitude and speed, it has excellent control response.
- **TRACKING.** The plane will head wherever it's pointed and will track true and straight.
- **AEROBATICS.** The Giant U-Can-Do 3D was made for aerobatics, so of course it shines in this category!
- **GLIDE PERFORMANCE.** This plane is a floater. Deadstick landings are sometimes easier than coming in under power.
- **STALLS.** The Giant U-Can-Do has very mild stall characteristics. It won't drop a wingtip unless you input aileron during the stall.

PILOT DEBRIEFING

The Giant U-Can-Do 3D is a perfect plane on which to learn large-scale aerobatics. Its giant size gives you the feel and stability of the larger aerobatic planes without performing maneuvers at blinding speed. This gives novice 3D pilots time to execute maneuvers with the right combination of stick movements. Once the right combination of stick input is achieved, the Giant U-Can-Do 3D will perform to perfection. This plane is stable at very slow speeds and lends itself well to a wide variety of 3D maneuvers. I tied in the flaps with the aileron movement, and this gave the Giant U-Can-Do 3D a very large strip aileron. This helped to increase the aileron control response at slow speeds. Knife-edge flight presents few coupling problems, and this plane can hold the knife-edge for as long as you want.

The Giant U-Can-Do 3D is almost two planes in one. Its stable flight envelope and gentle but precise control response give it the exact flying characteristics that intermediate/advanced pilots need to perfect maneuvers. This same flight envelope means that more experienced pilots can perform just about anything that they can think of. Overall, I believe that this is a great flying airplane that all pilots will enjoy.

[ProductReview]

BY BOB ABERLE || PHOTOS BY PETE HALL

FMA DIRECT SKYVOLT

GET MAXIMUM LI-POLY PERFORMANCE!

Electric enthusiasts have enjoyed some incredible technological innovations: brushless motors, outrunners and Li-poly batteries certainly top the list. Now we can add FMA Direct's Skyvolt—a revolutionary battery and charging system that makes using Li-poly batteries easier and more accessible for modelers who want to fly .40 to .60 and larger planes with electric power. Interested? Read on.

Over the three years since Li-polys were introduced to our sport, electric planes have become competitive with fuel-powered aircraft. Recently, electric enthusiasts have wanted to convert .40- and .60-size, glow-powered planes to electric and, keeping pace with this demand, battery manufacturers have developed relatively light, small, Li-poly cells that have low internal resistance, high capacity and now, a load capability that can support larger 500 to 1,000W brushless motors. Even more important is how to safely charge these larger packs and make them last many cycles over several years. The more cells in a pack, the more difficult it is to keep the individual cells in balance (or at the same voltage level) after every recharge. Unbalanced cells in a pack can initially cause it to have a lower capacity (making it less efficient) and, in the long run, could cause some cells to be over-charged while others are under-charged, requiring the pack to be replaced.

Enter the FMA Direct Skyvolt Li-poly battery

system. Essentially, the Skyvolt cells are wired so that they can be individually accessed from outside the pack. A dedicated companion charger has individual outputs that charge each cell to a nominal 4.2 volts (or very close to it). Because they're charged separately, each cell eventually reaches the same voltage as the others, so the pack is considered "balanced." As an added safety feature, FMA has also developed a Discharge Protection Module (DPM) to place between the Skyvolt pack and your speed control. Because of these extra features, FMA recommends a higher (3C) charge rate for its Skyvolt packs, so you can fully recharge a pack in just 20 minutes!

SKYVOLT BATTERIES

For now, these new packs are intended for larger RC models that weigh at least 3 pounds. Skyvolt packs come with new Eagle Picher Kokam 3200mAh cells that are rated at 20C load capable. Assembled packs will be offered with 2, 3, 4, 5 and 6 cells (nominal 3.7 volts per cell). These cells are typically



Specifications

■ **SKYVOLT 6S CHARGER.** Has individual outputs to charge Skyvolt 2- to 6-cell packs. Input voltage: 12V DC (nominal); output current up to 10 amps; nominal output voltage, 4.2 volts per cell. 5½x3¾x1¾ in.; 36-in. input leads of no. 16 AWG terminate in large alligator clips. The output connector is a special, 7-pin proprietary type that mates with the battery pack. LED indicators monitor progress of charge. A dial (knob) sets the charging current. \$164.95

■ **SKYVOLT DISCHARGE PROTECTION MODULE (DPM).** Monitors each cell voltage separately and cuts off power system when any cell in the pack reaches 2.5 volts under load. BEC version weighs 1.3 oz.; Opto version weighs 1.4 oz.; 1½x1½x¾ in. \$54.95

■ **SKYVOLT CHARGE PROTECTION MODULE (CPM).** Allows you to charge a Skyvolt battery pack with a standard Li-poly charger. Does not balance cells. \$59.95

■ **SKYVOLT LI-POLY PACKS.** All cells inside the pack are individually wired so that each can be charged separately; that means that the cells will be charged to the same voltage and be balanced. A temperature sensor on the outside of each case helps you to monitor the pack.



long and narrow, so the packs are very similar to Ni-Cd and NiMH packs. A spacer between each cell allows air to circulate, and a pair of heavy-gauge, no. 12 wires exits the pack and terminates in a special multi-pin connector. This proprietary connector has two heavy-gauge pins that you connect to your speed control and motor. Smaller gauge pins access each cell within the pack. To save even more weight (and volume), follow FMA's instructions to remove the outer shell of these connectors. The instructions also show how to use extra hardware to lock the mating halves of these connectors together.

If your installation requires more than 6 cells in series, you can daisy-chain two packs using two DPMs (one for each battery pack) to go all the way to 12 cells in series.

I replaced a 3-cell, 2000mAh (15C) Kokam pack that weighed 6.2 ounces with a new Skyvolt 3-cell, 3200mAh (20C) pack that weighs 10.5 ounces. The model weighed more than 50 ounces, so the added 4.3 ounces for the new pack was of little consequence, and capacity increased from 2000 to 3200mAh! Skyvolt packs also feature a temperature-sensing strip that shows you how hot the pack is. FMA advises you to keep the pack under 135 degrees F, but the packs can tolerate temperatures of up to 150 degrees.

SKYVOLT 6S CHARGER

Powered by a 12V DC source, the Skyvolt is able to charge as many as 6 cells up to 10 amps current. The output contains the mating half of the Skyvolt battery connector. The connector has a separate output for each cell

so that the cells are charged individually. As each cell reaches approximately 4.2 volts, its output will turn off. When the last cell reaches that voltage, the charger's LED will glow a steady green to tell you that charging is complete and that the pack is perfectly balanced. You select the charge current by turning a knob, and two LEDs indicate charging progress. If you'd like access to detailed

charging parameters, you can download the Skyvolt 6S Viewer Software from the FMA Direct website at no charge and attach FMA's interface cable (no. FSIM1) between the 6S charger and your PC.

This isn't necessary, but it provides interesting information for those who are curious.

SKYVOLT DPM

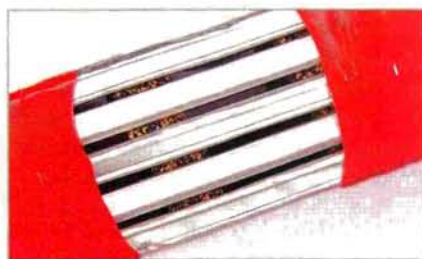
The DPM feature reflects the system's very conservative and safe design; it measures the voltage of each individual cell while you're flying so that none are discharged below 3 volts. You insert this approximately 2-ounce unit between the Skyvolt battery pack and your model's speed control (a special 12-inch battery-extension cable is also available).

The DPM is useful because while the low-voltage cutoff that's built into your speed control prevents the cells from being over-discharged, it only senses total voltage. In other words, if 1 or 2 cells in a pack are discharged below 3 volts but the voltage of the entire pack is above 3 volts, the battery might still work, and you could damage those individual cells. With the DPM, when the first cell in the pack reaches 3 volts, the

**Skyvolt
technology is
sure to transform
electric flight as
we know it.**



Two tiny switches on the DPM PC board must be set just once when you start using your Skyvolt system.



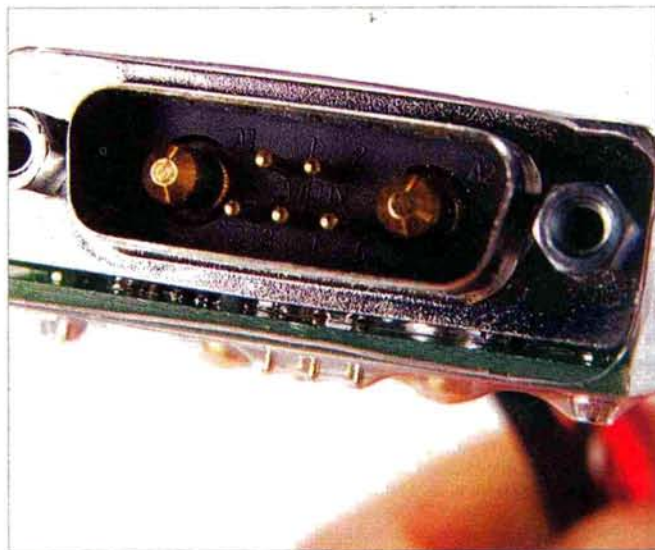
This end view of the 5-cell Skyvolt Li-poly pack shows the cell separators that allow air circulation.

Highlights

- Each cell inside a Skyvolt pack is separately charged to the same voltage, so packs are perfectly balanced
- Skyvolt batteries can be fast-charged at a 3C rate in 20 minutes
- Temperature sensors are on the outside of each Skyvolt pack
- CPM allows you to charge Skyvolt packs with a standard Li-poly charger



A close-up of the temperature sensor indicates the maximum suggested temperature: 135 degrees. FMA notes that the packs can tolerate temperatures of up to 150 degrees F.



A closer look at the FMA proprietary 7-pin connector. The two heavy-gauge pins provide power through the ESC to the motor. The five smaller pins access individual cells within the pack.

[ProductReview] FMA DIRECT SKYVOLT

unit will pulse the motor or turn it off completely, so it will react before your speed control has a chance. Two DPMs are offered: one for use with BEC-equipped speed controls and one for units that require a separate airborne radio system battery. The only downside is that the DPM will add weight and take up space in your aircraft.

TESTING FOR CELL BALANCE

You won't have to do this, but as a reviewer, it was important that I test my two Skyvolt packs first as I received them and again after I had charged them with the 6S charger. My second Skyvolt pack was a 5-cell version. The five cells' initial voltages read 3.80, 3.80, 3.82, 3.81 and 3.81—essentially balanced. After I had charged the pack with the 6S charger, the cell voltages were 4.21, 4.23, 4.22, 4.23 and 4.22; they were still almost perfectly balanced!

I was surprised that my 3-cell Skyvolt pack had 1 cell that was considerably lower than the other two: 3.82, 3.69 and 3.82 volts. My pack is not a production pack; the new production packs will most likely not have this much of an imbalance. But the low-voltage cell allowed me to test how well the Skyvolt 6S charger really works. It took the charger longer to get the 3 cells to 4.23, 4.21 and 4.24 volts, respectively. Now the cells were properly balanced, but without the Skyvolt charger, that pack wouldn't have lasted very long. That's why FMA offers this cell-balancing technology.

Packs Tested

■ **SVKOK3200-20C-1P3S** (3-cell, 3200mAh capacity and 20C load capable)—10.5 oz.; 5½x1¾x1 in.; \$196.50

■ **SVKOK3200-20C-1P5S** (5-cell, 3200mAh capacity and 20C load capable)—16.9 oz.; 5½x2x1¾ in.; \$312.50



The two tested Skyvolt Li-poly battery packs (5-cell above, 3-cell below). Note the heavy cable leads that terminate in a special 7-pin connector. This connector charges each cell separately. Note the separators between the cells; they allow air to freely circulate.



End view of the charger showing the special multi-pin connector.

Now you can charge a fully depleted Skyvolt battery back up to full capacity in approximately 20 minutes, just as you did Ni-Cd batteries.

FLIGHT TESTS

I flew the 3-cell Skyvolt battery with the DPM in a Hobby Lobby Bonnie 20 ARF that weighs 59 ounces. My 1-year-old, 2000mAh pack provides about 7 minutes of flight because the Bonnie draws considerable current. With the new Skyvolt 3200 pack, the flight time increased to 10 to 12 minutes. Although the Bonnie picked up 6 extra ounces with the Skyvolt battery and DPM, performance was still excellent.

Next, I flew my 5½-pound Acrovolt electric pattern aircraft. It was originally powered by a 20.1-ounce Kokam 5S2P 2000 (20C) pack with 4000mAh capacity (2 parallel sets of 5 cells in series). That battery provided 15 minutes of good pattern-type flying. Then I went to the Skyvolt 5S1P (5 cells less than the older pack) but now with 3200 capacity. It has a lower capacity, but the battery weighs 3.2 ounces less. Add the 1.4-ounce DPM, and the net reduction is only 1.8 ounces (negligible in a 5½-pound plane). The new Skyvolt pack provided 15 minutes of solid flight time before the DPM cut off the motor.

ADDED BONUS: A 20-MINUTE CHARGE!

One of the primary reasons for limiting Li-poly charge rates to 1C (one hour to recharge!) was the fact that unbalanced cells could result in both over- and under-charged cells in a pack. With the FMA system, cells in a pack will be balanced perfectly after every charge, so we can safely increase the charge rate to 3C (note that this is recommended only for Skyvolt batteries and

only when charged by a Skyvolt 6S charger!). Now you can charge a fully depleted Skyvolt battery back up to full capacity in approximately 20 minutes, just as you did Ni-Cd batteries.

CHARGE PROTECTION MODULE

A Skyvolt battery pack, DPM and 6S Charger is a sizable investment, so FMA has developed a Charge Protection Module (CPM) that allows you to charge a Skyvolt battery with a standard Li-poly charger. The CPM costs \$59.95 and contains a multi-pin connector that you can plug into a Skyvolt battery pack—but it will not balance your battery pack. It will prevent over-charging since each cell is being monitored, but because a standard Li-Poly charger is only single output, it can't charge each cell individually. Further, the charge rate is limited to standard 1C when using this module and a standard Li-poly charger.

SUMMARY

Skyvolt technology is sure to transform electric flight as we know it. FMA will produce more pack sizes, including some smaller ones. By the time you read this, Skyvolt 2000mAh batteries will have been added to the 3200mAh packs that are already available. I'm hopeful that a new breed of large electric ARF aircraft will follow! The revolution is just beginning. ✚

See the Source Guide on page 167 for manufacturers' contact information.

[FlightTest]

BY CHARLES MICHA || PHOTOS BY DERON NEBLETT



CENTURY HELICOPTER PRODUCTS

HAWK PRO

Bargain price—premium performance!

Over the years, the .30-size-class helicopter has seen performance gains through the use of larger engines and improved mechanics. The Century Hawk Pro is no exception. With its recommended Toki-40H engine, sleek body line and awesome power-to-weight ratio, the Hawk will allow beginners as well as advanced and 3D fliers to burn up the sky. I owned a Hawk a dozen or so years ago; I bought it primarily because it was affordable. The new Hawk Pro is a vast improvement on my original. It's packaged as an ARF and costs \$199.95 without an engine. With the Toki-40H and a tuned muffler, it costs \$329.95. Although it is a terrific choice for budget-minded modelers, the Hawk Pro's performance approaches that of a premium machine.





“ THE HAWK PRO'S PERFORMANCE
approaches that of a premium machine. ”

SPECIFICATIONS

MODEL: Hawk Pro

MANUFACTURER: Century Helicopter Products

MAIN ROTOR DIAMETER: 49.5 in.

TAIL ROTOR DIAMETER: 9.3 in.

OVERALL LENGTH: 46 in.

HEIGHT: 16.2 in.

FLIGHT-READY WEIGHT: 6.5 to 6.75 lb.

ENGINE REQ'D: .32 to .39 2-stroke

BALL BEARINGS: 47

RADIO REQ'D: 5-channel heli

PRICE: \$199 kit; \$330 w/Toki-40H engine and tuned muffler

HIGHLIGHTS

- Manual is easy to follow
- No-hassle building
- Low cost
- Excellent flight characteristics

GEAR USED

RADIO: JR 8103 transmitter & R770 7-channel PCM receiver; JR servos: 3141 (pitch, roll, elevator); 537 (throttle); JR 810G sport (tail)

ENGINE: Toki-40H

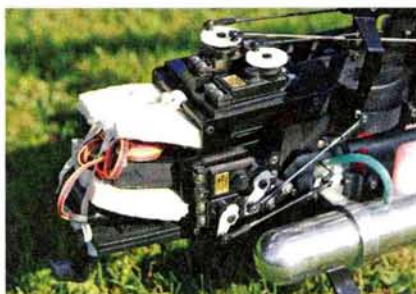
GYRO: Futaba GY401

FUEL: Morgan Fuels Cool Power 30%



COMMENTS

A big improvement on its predecessor, the Hawk Pro is well suited to beginners through advanced and 3D fliers. It's very easy to build and set up, and it's perfect for learning new tricks.



The Hawk Pro has plenty of room for a neat radio installation.



The tail rotor's servo mount is attached to the frame.

GETTING STARTED

The Hawk Pro's main sub-assemblies, such as the tail boom, tail box, rotor-head section, main body and servo tray are factory-assembled. The rotor head is of conventional (non-CCPM) design, is fully ball-raced and features a metal-composite swashplate. This results in a precise, rigid main rotor head. The tail-rotor drive is via torque tube, and a tail-mounted rudder servo provides superb tail control. It also comes with dual tail-boom supports that add rigidity to the tail boom. The clutch comes with the liner glued in, and the pushrods have been assembled with the ball links. Another feature I like are the balls that screw onto the servo arms; the 2mm hex is more resistant to being stripped than the usual 1.5mm hex. Furthermore, the Hawk comes with 47 bearings—no bushings!

The kit also comes with a set of wooden main blades that are fine for beginners and general sport flying. Advanced and 3D fliers will, of course, use their favorite fiberglass or carbon-fiber blades. Also included is a set of plastic tail blades. The rugged plastic canopy comes with a set of colorful decals.

The 24-page instruction manual is very well-illustrated and lists all the items needed to complete the heli. The Hawk's assembly is illustrated by a series of very clear photos. The manual also contains a breakdown of the main sub-assemblies, a useful list of replacement parts and a section on neat upgrades. A few examples of the upgrades are a fiberglass canopy, CCPM conversion, Constant Tail

Drive and a precision metal swashplate. I did, however, find that the setup instructions could have been more detailed. There is no mention of the pitch range or throttle setup. Since the Hawk Pro is suitable for beginners, I feel more detailed instructions should be provided. An experienced heli pilot won't have any problems. If you decide to stick with the kit the way it comes, though (with the exception of adding carbon-fiber blades), it will do all the 3D tricks you want.

ASSEMBLY

Putting the heli together could not be any simpler: just follow the pictures and the written instructions, and you will see what I mean. I put everything together in two nights, and I flew the next day.

Many of the parts are factory assembled, so I will highlight only the key steps. Just be sure to use thread-locking compound where recommended. As you would with any ARF helicopter, check all the screws, nuts and bolts for tightness. It takes only a few minutes and could save your heli.

Assembly begins with the clutch installation, which is straightforward. The engine/clutch is then mounted in the lower main frame. This assembly is then joined to the upper main frame, which contains the main shaft and swashplate assembly.

Next comes the bulk of the radio installation.



The stock, ball-bearing rotor head is smooth and precise.



TOKI POWER

You can buy the Hawk Pro with a Toki-40H engine and a tuned muffler, and I recommend this setup.

Displacing .40ci while having the physical dimensions of a .30 engine, the Toki-40H really makes the Hawk Pro come alive. With its large black heat-sink cylinder head, the Toki has a unique look for a heli engine; it looks more like an RC car engine. The engine is ringed, so starting is easy. Although ringed engines have a reputation for requiring long break-ins, it took no time at all to dial the engine in with my Morgan Cool Power 30% fuel. Throttle response was good throughout the operating range. As suggested in the instructions, I ran the engine on the rich side (an advantage of a ringed engine is that running it rich will not harm it), and I have been tearing up the sky ever since.

SPECIFICATIONS

ENGINE: Toki-40H

SIZE: 0.403ci (6.66cc)

TYPE: ball bearing (ringed)

WEIGHT (W/OUT MUFFLER): 11.43 oz.

SUGGESTED FUEL: 15 to 30% nitromethane with at least 20% lubrication oils

HP: approx. 1.4, depending on fuel and exhaust system used

GLow PLUG USED: Enya no. 3

PRICES: \$125 (engine only), \$160 (engine w/tuned muffler)

The servos and gyro are fitted to the servo tray, which is then attached to the main frame. This is followed by the fuel tank and muffler. The black landing gear is easy to assemble, and four Allen screws prevent it from moving. The tail boom, with the factory-assembled torque tube, is then installed. Make sure that the tail rotor operates freely and is fully engaged with the main gear.

The rest of the assembly consists of throttle, collective and cyclic linkage setup. All the linkages have been assembled and are the correct lengths for experienced fliers. The instructions tell you to adjust the collective control rod to 102mm for training and 100mm for 3D. No mention is made of how

far the pushrod, at the servo end, should be from the servo center. Since this determines the collective-pitch range, which is not given, a beginner may have some difficulty here. The same is true of the rotor-head linkages; the lengths are given for beginners, but no measurements are given for the servo end.

ALL IN ALL

I like everything about this machine—its sleek looks, rigid rotor head and the tail boom with its driveshaft. You don't have to worry about belt tension or fraying. You will like the rugged, freely moving tail gearbox and the way all the gears mesh freely. With the 47 supplied bearings, every part moves

smoothly. The Hawk Pro has a rear servo mount (attached to the body, not to the boom). The washout system and composite-metal swashplate improve the Pro even further and provide precise control. The heli is easy to start; it comes with the standard hex starting system.

I am completely sold on the Hawk Pro; it's a great 3D performer yet is suitable for beginners and advanced fliers. It hovers steadily, flies like the wind, does all the tricks you can handle and is very reasonably priced. The Hawk Pro is the way to go! ✈

See the Source Guide on page 167 for manufacturers' contact information.

In the Air

I did all of my flying with the stock setup and wooden blades. After checking everything out, I headed to the flying field. I did not need to do any break-in on the new Toki-40H powerplant; it started right up and idled well—very impressive for a new engine. As I have said, this is a terrific 3D machine. It will loop, roll, do 540s and fly upside-down. The Hawk Pro flies like a 50-size machine; you will like its awesome performance.

PITCH CURVE IN DEGREES

| | LOW STICK | MID-STICK | HIGH STICK |
|---------------|-----------|-----------|------------|
| ■ NORMAL | -3 | +6 | +10 |
| ■ IDLE-UP 1 | -10 | +6 | +10 |
| ■ THOTLE HOLD | -10 | +6 | +10 |

HOVER STABILITY

I used very little trim to get the Hawk in a steady hover. The blade tracking was very close with the factory-adjusted pushrods. The hover felt very solid, and the cyclic controls were well balanced. Gusts were not a problem for the Hawk Pro.

AEROBATICS

When I was happy with the trims and had run a few tanks of fuel through the engine, the heli took off like a bullet. During the next couple of test flights, I continued to dial in the positive and negative curves as well as the throttle curves. The power provided by the Toki-40H made sport aerobatics effortless. Stall turns with long vertical lines, 540-degree stall turns and large-diameter loops will make you look good. Rolls were also easy and stayed on heading. Mild 3D maneuvers such as flips were no problem using the wooden blades. More aggressive maneuvers would benefit from carbon-fiber blades. The Hawk Pro was just as happy on its back, and the autorotation was quite good for a 30-size helicopter.

All in all, the Century Hawk Pro is a capable—and affordable—performer!





LIGHTS ... CAMERA ... ACTION!

MAKE AN AIRBORNE VIDEO

Video cameras and RC aviation have been a popular duo for years. Just turn on your TV, and before long, you'll likely see an in-the-cockpit view of some sort of aircraft. Whether they're shot from a news helicopter or from the nose of a military unmanned aerial vehicle, images of the ground or of closely flying aircraft captivate us all.

Being an inventive bunch, RC modelers have tried to duplicate these impressive film clips. Some have duct-taped the family video camera to a giant-scale airplane, while others have built models specifically designed to carry expensive camera gear aloft. But carrying a valuable piece of photographic equipment is a dicey endeavor at best. What's really needed is an inexpensive camera/transmitter that can beam the signal to a ground-based receiver unit. The important word here is "inexpensive." Now, the wait is over!

THE WIRELESS CONNECTION

The complete MC-2 system from Micro Wireless provides everything you need to turn any RC model into a spy in the sky—and I do mean *any* model. Included is a $\frac{7}{8} \times \frac{7}{8} \times 1$ -inch camera/audio transmitter that weighs only 0.6 ounce, a 9V battery for the camera, a 4-channel ground receiver and

12V power cables and AC converters. The system is easy to assemble; you just plug the 9V battery harness into the camera, attach the power supply, and screw the antenna onto the receiver. Power for the receiver can either be from a 12V source (such as a car battery) or a 12V converter that plugs into a household 110V outlet. All that's left is to install the camera in your model and connect the receiver unit either to a video camera or a VCR/TV combination. Here's how I did it.

AIRBORNE INSTALLATION

For maximum signal reception, you should attach the camera unit to an external part of the model. Depending on your model's size, this allows the camera to be attached in an open cockpit for a pilot's-eye view, to a wing strut, on top of a wing or a wingtip, or to the model's fixed tail surfaces. An included attachment bracket helps secure the camera



Top: this is the ground-based, 4-channel receiver for the Micro Wireless video system. **Above:** for testing purposes, I borrowed my daughter's TV/VCR combo.

in any position you desire. You can aim the camera forwards, downwards, or backwards. It really doesn't matter; you are the director of this aerial epic!

I used a simple strip of $\frac{1}{8}$ -inch-thick plywood, cable ties and some wing-cushion foam to attach the camera to the interplane



struts of my Great Planes Stearman PT-17. I placed the camera so it faced forward but also captured some of the forward fuselage. This gives a view with some perspective of what's actually going on. If you stick the camera on top of the wing, for instance, you get an unrestricted flight view that's more like a bird's-eye view. All sorts of camera-angle combinations are possible; all you have to do is attach the camera securely and isolate it somewhat from excess vibration. Don't attach the camera to the engine cowl! (See the "Vibration test" sidebar.)

THE GROUND STATION

I found it best to set up a small table to support the receiver unit and antenna. You can plug it into a convenient power source and make the connections to the recorder. To make the project more fun, I borrowed my daughter's small TV/VCR combo and powered it with a 12V to 110V converter. The receiver has four channels to choose from, and all you have to do is select the proper one to match the camera. A sticker on the camera identifies its channel number. That's it. Now stick a tape into the VCR, and hit "record"!

LIGHTS, CAMERA, ACTION!

Now for the fun part. Plug the 9V battery into the camera, and make sure that it, too, is properly secured. Check with your ground crew to see whether the TV view is acceptable, and if everything is OK, taxi to the end of the runway and take off. It is advisable to have a mental image of what you want to do while the camera is rolling. Flying your model helter-skelter all over the place becomes boring after a short time, so develop a plan and then fly it.

A sample script might include low, slow passes (be sure to smile as the plane scoots

WIRELESS MICRO CAM 2

The MC-2 camera features a high-resolution, 380-line color image sensor with an integrated 2.4GHz transmitter and audio microphone, all in one unit. It sends the audio/video signal at 30 frames per second for an impressive 1,000-foot line-of-sight range. The camera is FCC-approved and requires no special license to operate.

THE MC-2 SYSTEM INCLUDES

- Wireless color camera
- 4-channel ground receiver
- Battery cable and AC adapters
- A/V cables
- Complete instructions

SPECIFICATIONS

CAMERA IMAGE: 1/3 color CMOS

RESOLUTION: 380 TV lines, 62-deg. angle

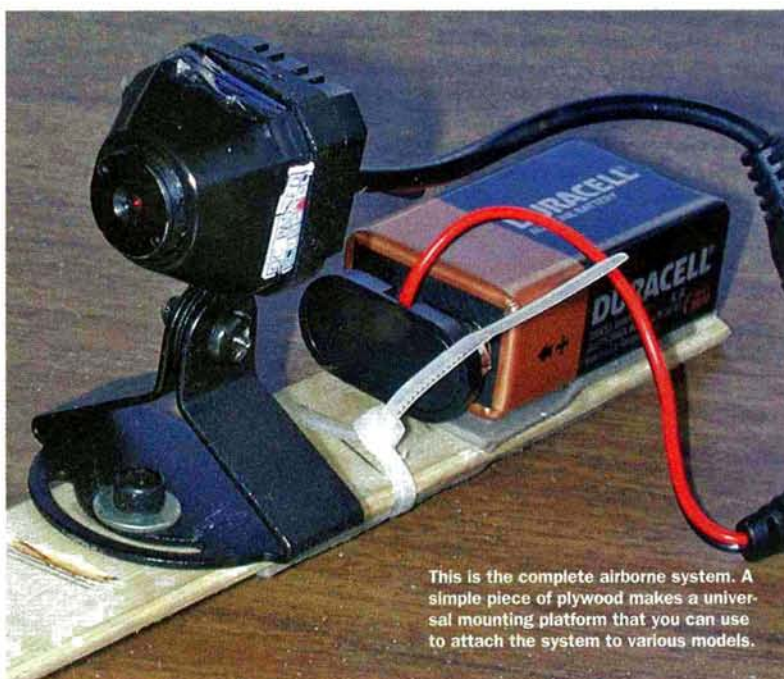
POWER: 9V DC

RANGE: up to 1,000-ft. line-of-sight range w/out obstacle interference

SIZE: 0.8x0.8x1.1 in.

WEIGHT: 0.6 oz.

PRICE: \$94.95 w/receiver and standard antenna



This is the complete airborne system. A simple piece of plywood makes a universal mounting platform that you can use to attach the system to various models.



VIBRATION TEST

To help evaluate several attachment methods and locations, I installed the MC-2 camera on an O.S. 120-powered Great Planes PT-17 Stearman ARF, an O.S. 1.08-powered Ultra Stick from Hangar 9, an electric-powered F-27 Stryker from ParkZone and a Zenoah G-23-powered Waco UPF-7 biplane from the old Pica kit.

The best camera-attachment locations for both biplanes were the interplane struts. The worst was on the vertical fin of the Stearman; excess vibration made the video quality very poor, though the viewpoint looking over the pilot's shoulder was dynamic.

I also attached the camera to the landing-gear strut of the Ultra Stick, and even though it was relatively close to the engine, the vibration levels were less than those of the biplane's vertical fin. The video produced with the electric-powered F-27 was very good due to the complete absence of engine vibration.

The best part of these tests was the fun we had placing the camera on people's models and letting them fly and view their air time. Even without taping the flights, just seeing them on the TV set at the field was a blast!

If you plan to be an aerial video photographer, be sure to test various camera installations until you find the best one for your particular model.

For samples of our in-flight test footage, take the click trip. Special thanks to test pilots Rolly Siemonsen and Robbie Francis!



Here, the camera has been attached to the vertical fin of my Stearman PT-17. I thought it would be a terrific vantage point, but it proved very vibration-prone.

click trip 
MODELAIRPLANENEWS.COM
 TO SEE THE AIRBORNE VIDEO

by!), then a few mild aerobic moves such as a loop and a roll. If you want to make everyone sick, throw in a 3-turn spin! Don't do wild gyrations or snapping maneuvers, as these don't translate well to the finished videotape. Then fly a nice traffic pattern and land. Walk over to the model, wave as you pass the camera lens, and unplug the battery. Tell your ground crew to turn off the recorder.

You can play the famous movie director and debut the action at your next club meeting. With a little planning and a variety of camera angles, you can edit your tape into a nice presentation that's suitable for club publicity functions and mall shows.

The MC-2 camera is so small and light that it can be installed in park-flyer planes as well. Just a little tape or Velcro®, and you're good to go.

CAMERA-CONTROL IDEAS

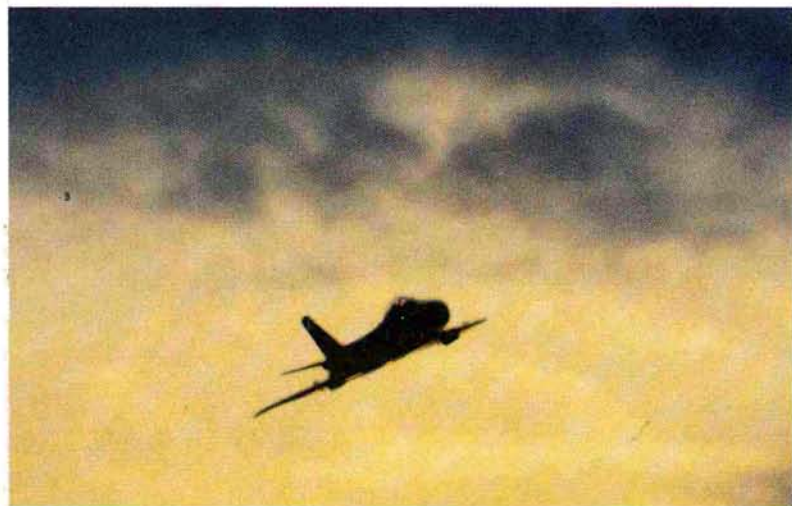
To add a bit of animation to your aviation movie, enlist the help of an assistant, and add camera pan and even elevation movement. Simply attach the camera to the output wheel of a servo, and you have instant control. You can control the camera's movement with a second radio, and the cameraman can sit at the ground station to view the action on the TV. This allows dynamic views of the ground as the camera is aimed and held on a fixed point while the plane circles overhead! Placing the camera/servo combo on a movable bracket attached to a second servo will give all the X and Y axis control you'll need.

So there you are—all this video fun for less than \$100. What a great way to spend an afternoon at the flying field! For more information on this and other camera accessories, check out microwireless.net. ✈

See the Source Guide on page 167 for manufacturers' contact information.

[FlightTest]

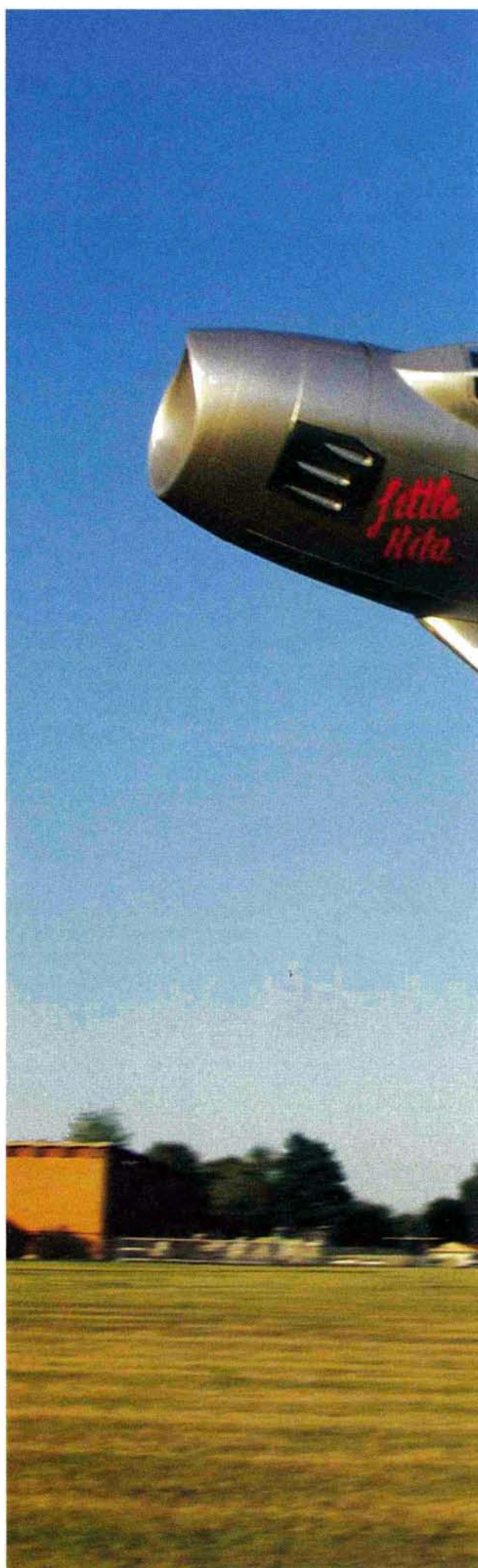
TEXT & PHOTOS BY MARK RITTINGER



ALFA MODEL F-86 SABRE

A fast ticket to MiG alley

You are climbing to 10,000 feet, streaming raw jet fuel behind you as you push the throttle quadrant to the firewall. To your back, the roar of the J47-GE jet engine and the safety of United Nations-held territory in the south of Korea. Dead ahead lie MiG Alley and a date with infamy! 1951? No, it's 2005, and this is no Korean conflict; it's the local schoolyard, thanks to Alfa Models and U.S. distributor Hobby Lobby Intl.



“The Alfa F-86 Sabre
MAKES A WONDERFUL
FIRST FAN-POWERED JET.”



SPECIFICATIONS

MODEL: F-86 Sabre
MANUFACTURER: Alfa Models
DISTRIBUTOR: Hobby Lobby Intl.
TYPE: electric ducted-fan ARF
WINGSPAN: 29.5 in.
LENGTH: 29.25 in.
WING AREA: 201 sq. in.
WEIGHT: 17 oz.
WING LOADING: 12.14 oz./sq. ft.
RADIO REQ'D: 3-channel
PRICE: \$169

HIGHLIGHTS

- Straightforward assembly
- Decals for five schemes
- Great flight performance

GEAR USED

RADIO: Hitec Focus SS FM 3-channel w/HS-55 servos and Electron 6 receiver

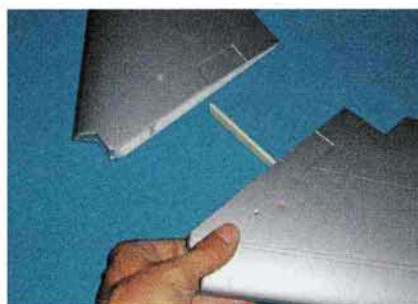
DRIVE SYSTEM: MP Jet 25/25-26 Mk 2 motor; fan unit (included); Jeti Advance 12 Plus ESC

BATTERY: Thunder Power 3-cell, 1320mAh Li-poly



COMMENTS:

Anyone who has aileron and elevator experience shouldn't have any problems flying the F-86 Sabre, and an average builder with ARF experience will be able to assemble it easily.



The Sabre Jet's wing panels come assembled, but they must be glued together and the plywood spar must be glued into place. Assembly is very easy.

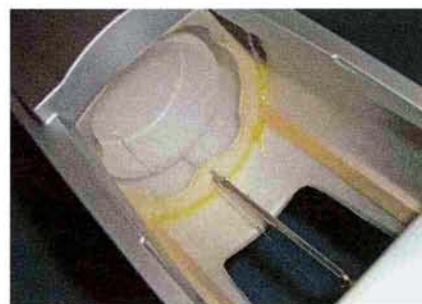
The Alfa F-86 Sabre Jet is an electric ducted-fan ARF with little in the way of complicated assembly. Constructed mostly of painted molded foam with a hardened outer shell, it has a thin plastic shield that protects the bottom of the fuselage during belly landings. Panel lines and rivet details are molded in very nicely. The hatch has a flawless, clear canopy already mounted. The kit comes packaged in a large, very well-illustrated box that comes in handy when it's time to add the decals, as it shows all angles of the finished bird. The ailerons and elevator come hinged and with the pushrods installed in the fuselage. A ducted-fan unit, decals for five different schemes and glue are all included. Hobby Lobby offers all of the power and control gear you'll need to finish the F-86.

ASSEMBLY

Building the F-86 takes no more than a few evenings; I had it up and flying in one week-end. I started by building the included fan unit. You may need to trim the inner area to fit your motor selection. I used the recommended MP Jet 25/25-26 Mk 2 motor from Hobby Lobby and found that it fit nicely after a bit of trimming. Add the hub, test-fit the rotor and run the wires through the tail cone.



The MP Jet Mk 2 motor and ducted-fan assembly fit nicely into place. Also visible are the wing hold-down inserts and the Jeti Advance 12 Plus ESC.



The large plywood former in the fuselage's mid-section must be drilled for the ducted-fan mounting screws.



Removing the main hatch cover gives you complete access to all of the radio and power-system equipment. Everything fits nicely and is well thought out.

I added 5 inches of wire to a Jeti Advance Plus 12 ESC to position it in the radio area. Add the ductwork after you trial-drill the holes for the fan mount in the lite-ply bulkhead. The rear duct is friction-fit, and the front ductwork fits perfectly with a bit of care and a small piece of tape inside. You'll be pleasantly surprised by how well it all goes together.

You'll have to glue the supplied lite-ply radio floor above the front ductwork; this fit very well also. Be sure to read the instructions regarding correct placement. Before you add the hinged dihedral stab, build the wing assembly to ensure correct tail alignment. The wings halves come assembled with the wire running through for the ailerons, which come hinged and with control horns installed. You must glue the plywood spar into place with epoxy in one wing panel, wait for it to dry and then glue the wings together in the center. The spar will guarantee proper dihedral, and after you've added that, you can install the plastic belly pan over the joint.

To install your servos, first cut out the servo areas and then follow the directions. I used Hitec HS-55s. To get the proper aileron control-surface throws, I used the hole closest to the center on each servo arm. Pop the wires into the horns, and fit the wing with the two included nylon bolts. Set the aileron up for $\frac{5}{16}$ inch up and down. Moving to the rear of the fuselage, remove the small foam

section and fit the stabilizer; be sure to check for alignment with the wing. Hook up the control horns and your elevator servo to the dual pushrods. Set up for about 1/4 inch throw up and down at the tip. The hatch is already built, so you have only to attach the radio gear to the lite-ply mount in the nose. I plugged everything into my Hitec Electron 6 receiver and was ready to start decorating this ship.

The provided water-slide decals allow you to make any of the five versions of the Sabre. I used some from a few versions and liked the result. When going around compound areas, I suggest that you make a few relief cuts in the decals with a new hobby blade. A piece of clear tape over the decals along the leading edge of the wing will help to protect them on landings. The wing has CG marks molded into it, so there isn't any guesswork; the plane balanced perfectly with the recommended Thunder Power 1320mAh 3-cell Li-poly. I ran the full-length antenna wire out of the fuselage top behind the hatch and to the top of the fin, and after a few flights, I substituted an E-Cubed R/C M72 Lite Antenna. This reduced drag and improved performance. Be sure to do a motor-on range check before you fly.

FLYING

After I checked the radio range and control deflection and direction, it was time to try the F-86 out. The weather was perfect at the schoolyard: blue skies and a slight breeze. My flying buddy John Fotiu took a few steps, and with a light level toss, the F-86 Sabre was up and flying. The plane has tremendous thrust for such a little fan unit and motor. No bungee launch needed here! Minor trim was required as with all new models. The F-86 has a very light feel to it and is more similar to a sport model than you might expect.

FINAL THOUGHTS

The Alfa F-86 Sabre is a great value: you couldn't scratch-build a small electric ducted-fan Sabre this light and this quickly for anywhere near the price of this kit. The jet goes together well; with excellent fit and finish, it has proven to be very durable. It looks great in the air and flies with beautiful characteristics. It makes a wonderful first fan-powered model for someone who has aileron and elevator flying skills. You'll love flying this little attention-getting jet! ✚

See the Source Guide on page 167 for manufacturers' contact information.

In the Air

The F-86 is a terrific flying plane. From a simple hand toss, it will get on step quickly and doesn't require a bungee or any running. When balanced at the CG point, it will literally fly out of your hand. The little jet is very smooth and handles like a little pattern bird throughout the flight. As it's a small model, you must stay on top of it because it will get quite small very fast once it's in the air.

CONTROL THROWS

- **ELEVATOR:** $\pm 1/4$ in.
- **AILERON:** $\pm 5/16$ in.

GENERAL FLIGHT CHARACTERISTICS

- **STABILITY:** the Sabre is very stable; no doubt the swept wings, large fin area and stab dihedral play a part here. Once put into a turn, it tends to stay where it was pointed. Inverted stability is also excellent, and little down-stick is needed. Roll stability is very good, and pitch stability is excellent.
- **TRACKING:** although the Sabre is small, it tracks well throughout all maneuvers and at all speeds. The fin is tall enough that high angles of attack do not seem to affect lateral stability. As long as the fan is getting good clean air, it pulls well and provides plenty of power.
- **CONTROL RESPONSE:** aileron and elevator response is immediate and predictable. The Sabre will go where you tell it to, so you must fly it and not let it fly you. With surface deflection at the specified amounts, you will find it smooth yet responsive.
- **GLIDE PERFORMANCE:** not to be confused with a glider, the F-86 actually prefers to have power on at landing to keep it moving and under control. It will glide well with power off.
- **STALLS:** the Sabre has a soft stall. It will mush and then drop a wing but recovers well as long as you have some altitude.

PILOT DEBRIEFING

I recommend the Alfa F-86 Sabre to any modeler who's looking for something a little different. It's a great first electric ducted fan and flies so well that you'll wonder how they designed it! This model can do most aileron- and elevator-type maneuvers, including split-Ss, Immelmann turns, 4-point rolls, inverted passes and even Cuban-8s. The wing holds up to dives from about 200 feet without any signs of weakness. To keep a clean, steady stream of air going through the fan unit, I have found it best to keep the turns open and wider than with a prop-driven plane. If the fan stalls, it takes a few seconds for it to "grab" again. As equipped, it provides a solid 8 minutes of aggressive aerobatics, and that is plenty long enough for this pilot! The Sabre is a great-flying model and a real value when you consider the engineering that went into it and its level of quality.



What's **HOT** for the **HOLIDAYS?**

BY THE MODEL AIRPLANE NEWS CREW

PHOTOS BY PETE HALL, DERON NEBLETT & JOHN REID

Great Planes PT-17 Military Stearman ARF A great first biplane!

1 Intended for intermediate to advanced fliers, this .91 to 1.20-size biplane features balsa-and-plywood construction, all-wood wings and factory-formed struts and landing gear. It comes beautifully finished in factory-applied Top Flite MonoKote. Priced at \$379.99, this classic primary trainer is ideal for modelers who want to fly their first biplane, and it is a natural for vintage scale and warbird fly-ins!





Don't look now, but the calendar hanging from the workshop wall is telling us that the RC holiday season is fast approaching! With so many outstanding products available these days, it can be a real challenge to choose among them.

The editors of *Model Airplane News* get to see a lot of those great stocking stuffers up close, so we've compiled a list of the hottest items out there—the stuff we'd like to see under our own trees this holiday season! If you want to help your family select a perfect gift for you, circle your favorites on these pages and leave the magazine in a prominent spot around the house. If you've been very good all year, you just might find one of these hotties under your tree!





Scale Planes

Great Planes Model Mfg. Matt Chapman CAP 580 Fun on a giant scale!

2 No doubt Santa will want to garage his sleigh and just ride in on this! The Matt Chapman CAP 580 from Great Planes is a nearly 100-inch-wingspan, $\frac{1}{3}$ -scale ARF that replicates Matt's awesome full-size aerobat—right up to its distinctive “paintball-splattered” trim. Priced at \$750, it comes with a complete hardware package; simply add a radio and an engine, and you'll have your very own version of Matt's showstopper!

SR Batteries Eindecker Excellent first scale kit

4 In the colder climates, modelers take refuge in their workshops during the long winter months. New and innovative construction techniques will make building this large Fokker Eindecker E-1 a joy for WW I buffs. This versatile 100-inch-span fighter is designed to be flown with a gas (G-26) or glow engine (1.20ci or larger) or with a motor (Axi 4130/20), and it costs \$349.95. The kit includes laser-cut wood, a spun-aluminum cowl and high-quality hardware.

Hangar 9 P-40 Mission-ready warbird

5 Join the famous Flying Tigers with your own Hangar 9 semi-scale ARF version of the P-40E Flying Tiger. The high degree of prefabrication will have you doing victory rolls in no time! The 64.6-inch-span P-40 accepts a .61 to .70 2-stroke or a .91 to 1ci 4-stroke. The Flying Tiger displays no bad habits and can be enjoyed by intermediate and advanced pilots. For \$259.99, you get many scale extras, including a set of 90-degree rotating retracts.

Kondor Model Products B-25 Mitchell

This bomber's right on target!

3 This impressive B-25 medium bomber from Kondor Model Products flies as good as it looks. Priced at under \$620, this Doolittle raider ARF comes with all the parts factory-built and covered, so you can get into the air quickly. It comes with retracts, has an 85-inch span and requires twin .46 to .70 engines for power. For the Jimmy Doolittle in all of us, this classic warbird twin is right on target.



Radios & Electronics

Eagle Tree Systems Seagull Onboard Data System

The need to know

6 This is the same tracking telemetry as NASA uses to supply information about Santa's progress on Christmas Eve—well, maybe not. But this telemetry system offers a plethora of information about what your plane is doing in the air—information such as its altitude, speed, engine temperature, radio-equipment glitches and much more. Priced from \$369.99 to \$499.99, Seagull systems are available for any type of aircraft you fly. And the best part? You won't need a Ph.D. in telemetry to use them!

FMA Direct Premier Servo Series

Digital adjustable control

7 The new FMA DS300 digital adjustable servos are a new approach to servo-control design. Available with nylon and metal gears, they're ideal for modelers who do not own computer radios; they can be set up without any special digital servo equipment. Servo direction and end-point can be set by hand, and the settings are stored in the servo itself! Their cost? Just \$13.95 to \$28.95.



Futaba 14MZ

Infinite control

8 If Santa is going to bring you a 14MZ, you'll have to be awfully good! With a Microsoft Windows CE processor to enhance non-flight details such as input communication and compact flash card memory, the 14MZ (priced at \$2,200) can operate on any frequency and offers 100-model memory, nine flight-condition modes and 32 selectable functions! Its main display can even show photos of models and give audio prompts.



Sombra Labs Shadow 3 Receiver

Pick a channel—any channel

9 No worries about which elf is on which channel when you have the Shadow 3 receiver in your plane! This tiny, lightweight, 7-channel receiver can be programmed for any channel in just a matter of minutes. Simply dial in the frequency you want to use on the programmer, and the receiver will be set. It works with both positive- and negative-shift transmitters, and two receivers can be piggybacked to create a 14-channel receiver for your giant-scale plane. Priced at only \$79.99, this receiver is affordable for all of your aircraft.



JR XP9303

9-channel delight!

10 With its large, easy-to-read display and unique roller-switch menu navigation, this 9-channel radio is a delight to program and use. It offers 30-model memory and super-flexible mixing functions, and it works with three types of models: airplanes, helicopters and sailplanes. Besides all the usual features, it also has device-select, two throttle curves, six programmable mixers, fail-safe, three timers and much more—all for less than \$500.



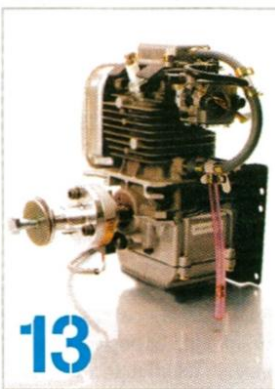
11



Fuji Imvac BF-34F EI

4-stroke power for gasoline

13 Priced under \$800, this gasser comes ready to be bolted on your big-bird model and can turn a 22x10 prop (usually used by 2-stroke gas engines with twice the displacement)! It has a true oil sump (with a dipstick) so you don't have to mix your oil and gas, and it comes with everything you need, including a spark plug, electronic ignition and an efficient compact muffler.



13

O.S. .46AX

Classic glow power—now even better!

14 This powerplant produces 13,150rpm on an 11x5 prop while it spits out an impressive 1.23hp. Best of all, it remains a classic O.S. product where it counts: first-class machining and design. Ideal for sport, pattern and scale aircraft, the .46AX (\$150) is super-easy to start and break in, and it has a rear-mounted, main-needle valve for added safety. What more could you want?

Engines

Saito FA-220

The biggest single 4-stroke yet

11 The new Saito FA-220 (\$499.99) takes power-to-weight ratios to new heights. It's the biggest single-cylinder, 4-stroke model airplane engine ever. Ideal for medium to large scale, it has an optional fuel pump for those who want the ultimate in power to swing a 20x8 prop! All of the high-quality features that Saito engines are known for make this the stocking stuffer of the year!

Mark Model Engines M2.10

A powerfully good value

12 This impressive glow-powered dynamo makes impressive power and does it without nitromethane! You can run it on FAI (no-nitro) methanol fuel and spin 20- and 22-inch props all day long! In fact, it will produce 28 pounds of thrust at 7,800rpm with an APC 20x8W prop while singing at 95dB. Best of all, this powerful engine weighs less than 3 pounds and costs less than \$320!

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Sport Planes

Carl Goldberg Products Pitts Model-12

A monster of an ARF!

15 This IMAA-legal, aerobatic biplane can do it all! Intended for experienced fliers and priced at \$400, this 1.20-size biplane features all-wood construction, has an impressive hardware package and comes expertly finished in premium covering material. With one-piece wing construction, high-quality craftsmanship and awesome aerobatic performance, this monster is hard to beat!

JR Vibe 90 3D Helicopter

Competition-ready

16 This hot, competition-level heli can perform any 3D move. Designed with input from heli greats Curtis Youngblood, Len Sabato, Marty Kuhn and others, the Vibe 90 is a world-class machine with spectacular performance. It features 140-degree CCPM, carbon frames and fins and a painted fiberglass canopy. It's designed for .90ci engines, and it lists for \$1,100.

Model Tech Delta Fighter 90

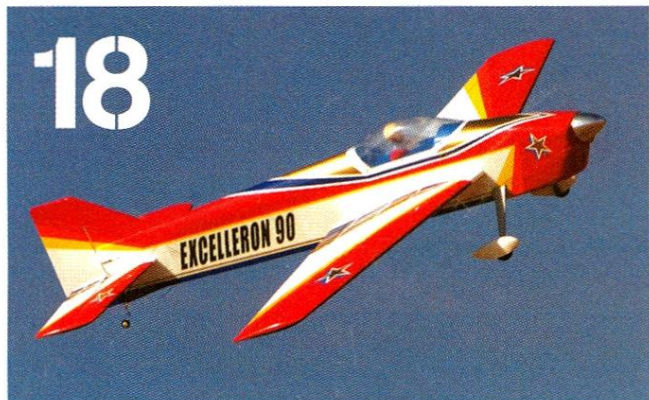
Test your reflexes

17 Looking for something unique to fly in the upcoming year? The Model Tech Delta Fighter 90 fills the bill. This 54-inch-span model has 1,287 square inches of wing area and requires a .61 to .91ci 2-stroke engine. It offers exhilarating speed and aerobatic capabilities, yet it's stable and makes nice, slow, nose-high landings. Best of all, it's an ARF and costs only \$199.

Sportsman Aviation Excelleron 90

Out-of-the-box excitement

18 This sharp-looking pattern ship stops everyone in their tracks! It looks great, and even better, it has wonderful flight characteristics. It can do it all and is an ideal ARF for freestyle aerobatics, F3A pattern, or artistic aerobatics. Priced under \$280, the Excelleron 90 is a great choice for any .90 to 1.20 engine!



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Hangar 9 PTS Mustang

Basic to advanced training

19 This Mustang is a sheep in wolf's clothing, and priced at \$399.99, it comes with everything you need to learn to fly except a flesh-and-blood instructor. The model can evolve as your flying skills improve, so it's a trainer and a first sport plane in one. A JR transmitter, Evolution engine, CD instructions and even a flight simulator come with this complete package!

19



Electric Planes

Hobby Lobby Intl. Leki with Axi 4130/16 Brushless Motor

Electric aerobatic performance

20 The Axi 4130/16 brushless outrunner motor, Jeti Advance Plus 77 Opto ESC, Kool Flight Systems Ultimate BEC and Thunder Power 6s2R 4200mAh battery provide excellent aerobatic performance for the Graupner Extra 300L Leki. This hot performer has a 63-inch wingspan and a wing area of 657 square inches, and for those pilots who prefer glow, it can be powered by a .60 to .90 2-stroke or a .90 4-stroke. The Leki is available for \$199 from Hobby Lobby, which also distributes all the components to electrify the Extra.

E-flite Yak 54F

Wing-bending performer

21 Flown by Quique Somenzini at the 2004 eTOC, the E-Flite Yak 54F is based on Quique's larger, 72-inch Yak 54. The Yak has a rigid A-frame foam fuselage construction that's designed for strength and reduced flex, and that allows the model to fly more precisely. It includes a 6.6:1 gearbox and a 12x6 electric flight propeller. Priced at \$59.99, the Yak is ideal for intermediate to advanced pilots.

Thunder Tiger Mister Mulligan

Golden-age classic

22 Thunder Tiger's re-creation of the Howard Aircraft Co.'s DGA-6 Mister Mulligan is a great choice if you enjoy relaxing, scale-like flights. Many scale details such as a dummy radial engine, wheel pants and wing struts are included in this 39.3-inch-wingspan pylon-racer replica. The ARF includes a 370 motor, a gearbox and prop for \$77.99; the RTF SuperCombo costs \$209.99.

Sig Kadet EP-42

The Kadet goes electric

23 The Sig Kadet series of airplanes is synonymous with gentle flying qualities. This fine-quality, balsa-and-plywood ARF electric version continues the tradition. With a wingspan of 42 inches, it is small enough to keep in the car for spur-of-the-moment flying. For \$150, it comes with an installed Speed 400 motor and an ESC. First-time fliers will appreciate the Kadet's stability, and experienced pilots will enjoy its relaxing flights.

Graupner Nemesis

Tiny dancer

24 This miniature model of a full-size pylon racer weighs only 3.26 ounces but provides tons of fun for park fliers! Distributed by Hobby Lobby Intl., the all-foam, \$49 Nemesis can be flown indoors in a good-size building or outside in light winds. It's easy to assemble; it comes in three basic sections and includes all the micro hardware you'll need. The Nemesis is one neat little package!



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Stocking Stuffers

Dave Platt Models Black Art Video Series

For your viewing pleasure

25 For less than \$35 per DVD or tape, this collection of model building and finishing secrets is a perfect stocking stuffer for your favorite scale modeler. Filmed in Dave Platt's own workshop, the Black Art series covers a wide variety of scale-modeling topics, including advanced designing and building, finishing and painting, fine detailing and documentation—even using two-part epoxy paints! Learn from the master.

Du-Bro Fillin' Station

Fill 'er up

26 Like Du-Bro's original Fillin' Station, this new Can version includes everything you'll need to fuel up your plane! For only \$59.95, you get a Kwik Fill fuel pump, a Kwik Fill fuel-cap fitting, silicone fuel tubing, built-in tool holders, anodized glow-plug holders, a Kwik Start glow-plug igniter and a 4-way wrench. Talk about a gift that keeps on giving; this one will be used again and again!



Multiplex Multicharger LN-5014

Small-package powerhouse

27 Never experience the dead-battery blues with this small, full-featured charger that can accompany you anywhere. The Multicharger offers a full house of features and simple programming. Just select your battery type, capacity and voltage, then push the start button; before you know it, your pack will be fully charged. For only \$83, you can charge Ni-Cd, NiMH, Li-poly, or Li-ion packs from any 12V power source.

Hobbico 72MHz Frequency Checker

Shirt-pocket radio protection

28 Being able to scan the RC frequency spectrum whenever you want is a great way to improve your safety at any flying field. With its bright multi-LED indicators (for all 50 frequency channels), Hobbico's Frequency Checker lets you turn it on and see who's on the air! Priced at a reasonable \$49.95, this pocket-size scanner runs on 3 AAA batteries and can be taken with you anywhere, anytime.

Wildcat Fuels High-performance Fuels

Feed your engine right

29 "Innovation through engineering" is Wildcat's motto, and it's one that has been proven repeatedly. Its latest breakthrough for 3D fliers is a 30-percent nitro and 23-percent synthetic oil called Youngblood Performance 30 that's designed to smoke less during full-power flight yet still properly lubricate and protect your engine. It costs about \$21 a gallon. Wildcat Fuels' superior products will take your airplane's performance to the next level!



MRC Reflex Flight Simulator

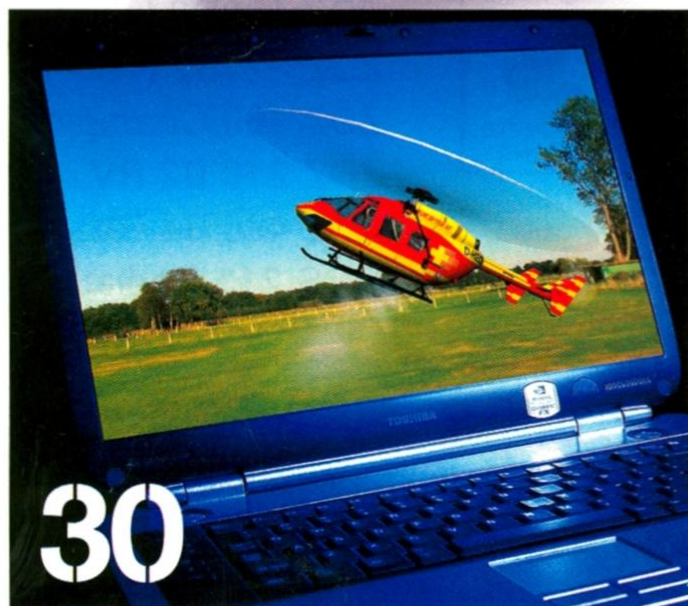
Sharpen your reflexes

30 Hone your skills in the comfort of your own home with the MRC Reflex Flight Simulator. It features a wide range of aircraft (18 airplanes and 17 helicopters) and flight-training aids, such as glaring sunshine, strong winds, engine failures and the choice of landing in long or short grass. With the included interface cord and USB adapter, you can use your own familiar transmitter. Priced at \$234.98, novice and experienced pilots will enjoy the benefits of this photo-realistic simulator.

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Great Planes RealFlight G3 Flight Simulator

Keep your thumbs hot year-round

31 Don't let the white stuff outside keep you grounded. The new RealFlight R/C Flight Simulator Generation 3 (G3) features RealPhysics 3D for a smoother, more realistic flying experience. High-alpha 3D maneuvers feel just like the real thing. Additional enhancements include cool new airports, 50 square miles of 3D scenery and many new aircraft, including park flyers, gliders, slope-soarers and 3D aerobats. At \$199.98, RealFlight Generation 3 is bound to be on every pilot's wish list.

Du-Bro E/Z Glo Igniter and Tester

Beep and go!

32 The new E/Z Glo glow-plug igniter and tester not only effectively lights your model's glow plug but also tests the plug's condition when you press on it! If your plug is good to go, the unit will beep; if it isn't, it won't. Nothing could be easier! Priced at \$24.95, the E/Z Glo comes with a 1700mAh battery and charger.



33

AstroFlight Super Whattmeter

Perennial favorite

33 AstroFlight's Whattmeter has been used and appreciated by modelers for more than 15 years. It measures electric motor current, voltage and power for model airplanes ranging from park flyers to 1/4 scale. The new Model 101 will work below 4 volts if you plug in a standard RC system 4-cell Ni-Cd or NiMH battery pack, and it also features improved resolution of up to 10 milliamps! This little treasure is priced from \$54.95.

Apache Smart Charger

No-brainer Li-poly charging

34 Take the guesswork out of charging Li-poly packs. The Apache Smart Charger uses wire jumpers to charge 1 to 4 cells at from 250mA to 2500mA. Priced under \$50, the Smart Charger operates on 12 volts.



Bob Smith Industries CA Glue

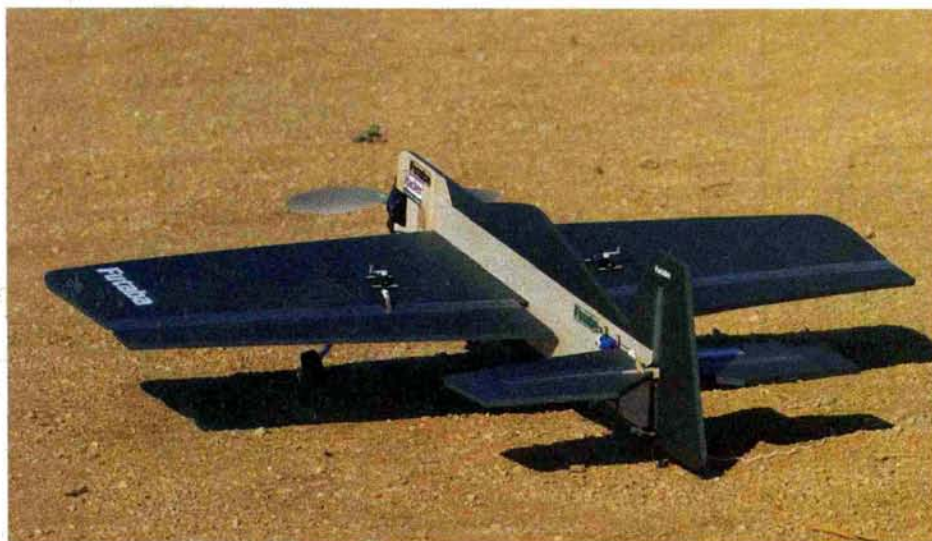
An Insta-Cure for what ails ya!

35 Everyone needs a little glue, and there's nothing better for stocking stuffing than an assortment of cyanoacrylate (CA) glues and accelerators. BSI Insta-Cure adhesives come in an excellent assortment (thick, thin, orderless, gel, flex, etc.) and feature a variety of tips to handle all of your modeling needs. Available in various sizes, Insta-Cure glues and refills range from \$3 to \$27. +

See the Source Guide on page 167 for manufacturers' contact information.

35





MORRIS HOBBIES SU-DO- KHOI

Quick-building electric 3D foamie

The Sukhoi is likely the most manly-man-looking aircraft ever designed for full-scale aerobatics, and Morris Hobbies' Electric Su-do-Khoi captures that aggressive feel—and then some! Because Morris Hobbies sells the Electric Su-do-Khoi with a Hacker A20 brushless motor, a speed control and an 1100mAh Li-poly battery that are ideal for the airframe, there isn't any guesswork involved in getting unlimited vertical performance. With the high thrust-to-weight ratio afforded by a light airframe and highly advanced, brushless-motor technology, this combination is guaranteed to please!





“ If you are looking for an aggressive 3D foamie, Morris Hobbies' Su-do-Khoi COULD BE THE HOT TICKET FOR YOU. ”

SPECIFICATIONS

MODEL: Electric Su-do-Khoi
MANUFACTURER: Morris Hobbies
TYPE: indoor/outdoor electric 3D foamie
WINGSPAN: 32.75 in.
WING AREA: 364 sq. in.
WEIGHT: 14 to 15 oz.
WING LOADING: 5.9 oz./sq. ft.
POWER REQ'D: brushless outrunner motor
RADIO REQ'D: 4-channel
PRICE: \$340

HIGHLIGHTS

- Assembly was simple, fast and straightforward
- Clever use of balsa to create a very rigid structure

GEAR USED

DRIVE SYSTEM: Hacker A20-30M, X-13 ESC, APC E-Props (9x3.8, 10x4.7)

RADIO SYSTEM: Futaba 14MZ transmitter, Futaba R156F 6-channel micro-receiver, Hitec HS-55 servos

BATTERY: Falcon Predator 1100mAh, 3-cell Li-poly



COMMENTS:

I found it easier to chamfer all of the bevels for the wing, tail and control surfaces prior to installation; it's easier to do that when the parts aren't attached to a fuselage.

WHAT'S IN THE BOX

When I opened the box, I was pleased to discover that, in addition to the foam and balsa required for the airframe, the pushrod hardware, control horns, Dave Brown wheels, Morris Mini Profile landing gear, Du-Bro tail-wheel and EZ Connectors, foam-safe CA and accelerator were all included. Also included was a brand-new Hacker Brushless A20-30M Outrunner complete with an ESC! All I needed to add was a couple of evenings, 4 servos and a Futaba R156F receiver. The plane parts were packaged inside a clear plastic bag. Not many parts here, so identifying the items was a no-brainer.

ASSEMBLY

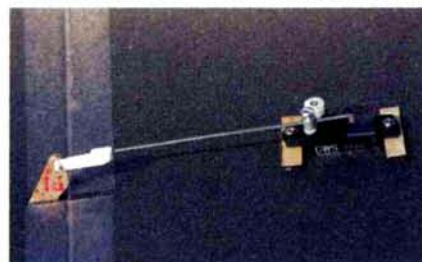
If you are accustomed to assembly manuals from larger manufacturers, you are likely to find this plane's manual rather thin. It is not beautifully printed and highlighted with little checkboxes for each step; instead, the brief instructions are supplemented by very informative photos that almost render the text obsolete. When you get right down to it, I would rather not pay the production costs for a novel to build something as straightforward as the Morris Hobbies Electric Su-do-Khoi.

Before I began, I read the directions from start to finish. I deviated from them by sanding the hinge-line bevels prior to gluing any wing or tail into place; it's just so much easier to do it beforehand. OK; let's get to it.

Fuselage. Morris Hobbies uses 1/32 balsa as a laminate to add stiffness and strength to the fuselage. You will not see the stabilizer trailing the wing while doing rolls with this plane! Use thick CA to laminate the balsa to one side of the foam fuselage. The manual directs the builder to cut out the wing and tail slots before the second balsa lamination. Here is where I took a bit of liberty to make modifications for my specific preferences. After all the balsa had been laminated onto both sides of the foam, I added a 1/4-inch



After I attached the balsa fuselage stiffeners, I made the motor cutout. Accurate motor-mount placement is crucial because it's difficult to change them later.



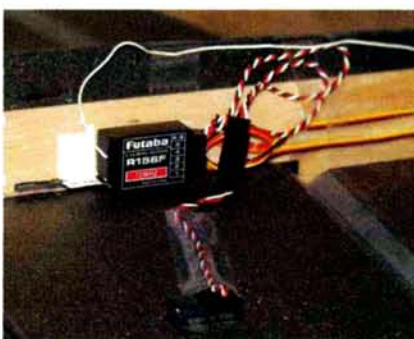
The quick connectors on the servo arm provide a solid connection and permit quick adjustments.

piece of plywood doubler where the landing gear is clamped to the fuselage.

Rather than use the standard "stick-mount" scheme shown in the manual, I cut the square hardwood into two sections at a shallow angle. I then glued these into place above and below the motor cutout so that I could secure the top and bottom of the motor mount. The standard stick mount suggested in the instructions will work just fine for a normal installation.

The next step is to install the tail servo. This is straightforward, and all the hardware for the pushrods is provided in the kit.

Wing and stabilizer. This is super easy to do, and I encountered only one surprise. The slot for the carbon rod was a little undersize, so I folded a bit of sandpaper over an 1/8-inch dowel and opened up the slot just a bit. I



Because the Futaba receiver is so light, its placement was dictated by the length of the servo wires—not the CG's location.



I made two slots in the fuselage so I could place a Velcro® strap around the battery for added security during high-G maneuvers.

glued the tube spar into place and weighted it down with a stack of *Model Airplane News* issues. I found it easier to make the aileron servo cutouts before I bonded the wing into the fuselage. When you glue the wing into place, make sure that it is jugged up squarely before the foam-safe CA sets up.

Next, I installed the servos and then jumped on to the stabilizer installation. Remember, I chamfered the wing and stabilizer hinge lines before I glued them in. Again, I made sure that the stabilizer was squarely jugged before the CA hardened. The next step is to glue the plywood control horns into place. I noticed that the grain on my control horns was running in the wrong direction, so before I installed them, I CA'd an additional 1/4-inch plywood layer with the grain running in the proper direction and then drilled the holes for the pushrods. I sanded a bevel into the horn so that it matched the control surfaces. I took all the beveled control surfaces and some hinge tape and attached them to their respective aerosurfaces.

ADDING POWER & CONTROL

The final step is to install the motor, the ESC and the receiver and secure all the wires. I used Velcro® to secure these components, but I'm not convinced that when I yank into a 15G wall, a single layer of Velcro® will adequately secure the battery. For additional security, I cut two 1x2-inch slots in the fuselage so that I could wrap Velcro® around the battery. Once the radio and motor had been secured, I was ready to balance the plane.

The instructions erroneously indicated a center of gravity (CG) at 1 inch behind the carbon-fiber wing spar. Oops—can you say “automatic harrier”? I called the folks at Morris Hobbies, and they told me that the CG should be at the spar. I moved the battery to the leading edge of the wing, and that put the CG at the front of the wing spar. Now the plane flies great!

FINAL THOUGHTS

This is one short, sweet project. The plane is a straightforward build that's extremely fast without any surprises. When you've finished the assembly, you'll have a great little indoor/outdoor 3D model to hone your skills with. If you'd like to get into electric 3D but have been unsure of which motor system to use, this plane/motor/speed control combination from Morris Hobbies is a dream come true! ✦

See the Source Guide on page 167 for manufacturers' contact information.

In the Air

Once the CG is in the correct place, this plane can fly as docilely as you like, or it can easily chase its own tail. It's all a matter of when to use high rates, low rates and throttle management. Twenty percent power will be enough to maintain level flight, but who does that with this plane? The plane will “bank 'n' yank” so tightly that a high school gymnasium will provide adequate space, as long as you are accustomed to continually turning to stay in a confined space. Takeoff is as simple as tossing it into the air and adding power, or you can ROG it in about 10 feet. When landing, keep in mind that this plane is similar to other flat, foamie planes. Do not expect it to glide any distance without power. It needs a bit of power during landing until just before touchdown. It is just a bit draggy, and that is part of the way foamies fly—with all their equipment hanging out in the breeze and a flat wing.

CONTROL THROWS

The manual didn't indicate any control-surface throws, but I used the following and feel that it's a good place to start.

- **ELEVATOR:** ± 2 3/4 in. (3D/high), expo: -70%; ± 1 in. (low); expo: -25%
- **AILERON:** ± 2 3/4 in. (3D/high), expo: -60%; ± 1 1/2 in. (low); expo: -35%
- **RUDDER:** ± 3 in. (3D/high), expo: -50%; ± 1 1/2 in. (low); expo: -35%

GENERAL FLIGHT CHARACTERISTICS

- **STABILITY:** the plane is predictably responsive on all three axes. This model has adequate control authority at low speed, yet it isn't twitchy at high speed.
- **TRACKING:** it tracks great, and with the CG in the proper location, this plane will fly upright or inverted at 50-percent power with only slight elevator corrections.
- **AEROBATICS:** the plane will do all the standard 3D stuff, walls, parachutes, hovering, waterfalls, torque rolls, etc.
- **GLIDE PERFORMANCE:** do not expect it to glide any distance without power.
- **STALLS:** other than a bit of pitch and roll coupling to rudder, it doesn't have any nasty tip-stalling characteristics.

PILOT DEBRIEFING

The Electric Su-do-Khoi's ailerons are not huge by 3D foamie standards. They are, however, adequate for everything you want to do except blurringly fast rolls. I don't really like to do those anyway. One thing to remember: there is no inertia with this plane, so a maneuver such as a wall requires some prop blasting over the tail to get it to rotate 90 degrees. The harrier performance could be enhanced by using “snap flap.” Throttle is a precision control with this plane. I think the most impressive stunt this plane does is a stationary inverted flat spin. With proper power management, it will just hang there and go around and around without climbing or descending.

I tried a Hacker Brushless A20-22L; this bigger motor with ESC is only 0.6 ounce heavier, and I feel that a model of this size can handle the additional weight. The optimum prop with the bigger motor is an APC 11x3.8 E-Prop. It will accelerate from a dead-stop hover to maximum velocity in about 10 fuselage lengths—vertically! Its 10- to 12-minute flights typically use 85 percent of the battery capacity, and temperatures were all fine. I strongly recommend the larger Hacker Brushless A20-22L outrunner motor. The folks at Morris Hobbies concur with me on that. If you are looking for an aggressive 3D foamie to keep at the ready for those spontaneous flying sessions, Morris Hobbies' Electric Su-do-Khoi could be the hot ticket for you.



[MicroRC]

TEXT & PHOTOS BY ROGER CARIGNAN



AERONCA CHAMP

CONVERT A GUILLOWS KIT TO RC

When I decided that my next project would be a scale Aeronca Champ, I first thought I would build it out of sheet foam. When I started drawing the plans, however, I found that it would be difficult to accurately depict its scale features with foam.

I wanted a design that an average modeler could reproduce without making elaborate forms, so I purchased a Guillows rubber-powered free-flight kit of the Aeronca Champion 85 (kit no. 301) and planned to convert it to RC. After reviewing the kit contents, I realized that I would need to make a lot of changes to turn this into an RC model. Read on to see how I did it.

GETTING STARTED

You can save significant weight by replacing most of the kit-supplied balsa with contest-grade balsa. The density of the kit-supplied balsa for the bulkheads and other parts was 12.9 pounds per cubic foot; 10.6 for the stringers! Some of my heavier contest balsa weighed less than half this much. Another advantage of cutting new parts is that they

will fit better than the die-cut parts and will save you time during assembly. For strength, use the kit-supplied balsa for the stringers, wing struts, wing spars and the leading edge. You'll need one sheet each of $\frac{1}{32}$ -, $\frac{1}{16}$ - and $\frac{3}{32}$ -inch-thick balsa. Most of the parts will be from the $\frac{1}{16}$ sheet.

I found that the plans were excellent, and the parts fit extremely well. If you do not want to cut up the plans, make copies of the parts using a scanner or a copier. Attach these to the balsa sheet with spray adhesive, and cut them out with a fresh blade in your hobby knife, then remove the paper (use a solvent if necessary).

I used Weldbond glue for all wood-to-wood joints because CA tends to be heavier and more difficult to control. Another advantage to using water-soluble glue is that

Specifications

WINGSPAN: 24 in.

WING AREA: 84 sq. in.

WEIGHT: 44g

WING LOADING: 2.7 oz./sq. ft.

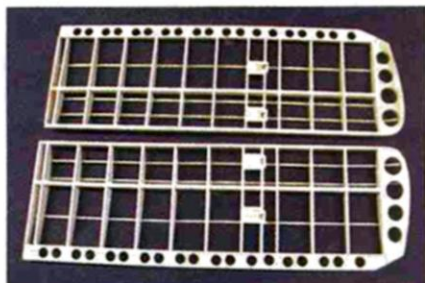
POWER SYSTEM: M-20 LV motor geared 6:1

PROPELLER: GWS 5043

BATTERY: single 170mAh Li-poly

RADIO REQ'D: 3-channel

RADIO SYSTEM USED: JMP Combo receiver, BSD MiniAct actuators



Making wing parts with contest balsa and using lightening holes will significantly reduce weight. Further weight reduction could be achieved with $\frac{1}{32}$ ribs and $\frac{1}{16}$ trailing edges.



Strengthen the wing strut-to-fuselage junction with $\frac{1}{64}$ ply joiners. Reinforce the hole for the hatch dowel with CA.



The $\frac{1}{32}$ balsa pushrod openings on each side of the fuselage facilitate covering in this area. Note the tapered shims to mount the stabilizer; these add 2 degrees to the stabilizer setting.



Check the hatch fit before final covering. The forward part of the hatch is positioned with a dowel; magnets in the aft section secure the hatch in place. I added finger openings in the hatch to more easily access the radio compartment.

you can take the joints apart by applying water (add heat from a sealing iron to speed the process).

FUSELAGE CONSTRUCTION

Cut out the pushrod guides shown in my modified plan. Use the one for bulkhead B7 to position the pushrod holes in this part. Cut the pushrod holes in B8 as shown. Install these guides and the B4 actuator-mount support at the same time as you install the bulkheads for the second half of the fuselage. Do not attach the bottom stringers between formers B3 and B5, as this is where the access hatch will be positioned.

Before you add the nose stringers, check the cowl fit to the nose, and if necessary, remove material from the edge of B1. Use $\frac{1}{32} \times \frac{3}{8}$ balsa to fill in the area where the wing struts are attached to the fuselage on the aft side of B3. You can slot these later to accept the wing-joiner struts.

Increase the stabilizer angle by 2 degrees as shown in the modified plan.

Cut away the lower keel between formers B3 and B5 as close to the bulkheads as possible; this will be used as part of the hatch assembly. Complete the hatch by adding the stringers and $\frac{1}{32}$ fillers around the hatch finger opening (see photo for details). Align the forward part of the hatch with a $\frac{1}{16}$ -inch-diameter dowel that fits into a mating hole in B3. Small magnets epoxied to the rear hatch former and B5 make a neat latch. For a better grip when you remove the hatch, glue some coarse sandpaper to the hatch keel at the finger opening.

I replaced the $\frac{1}{32}$ -inch-diameter wire landing gear with 0.025-inch wire to save weight. I attached it to the balsa main landing gear and held it in place with heat-shrink tubing. The kit wheels are too heavy, so I made much lighter 1-inch wheels out of blue foam. Make the tailwheel assembly out of an

aluminum soda can. The wheel is made out of balsa with a carbon-fiber axle.

BUILDING THE EMPENNAGE & WINGS

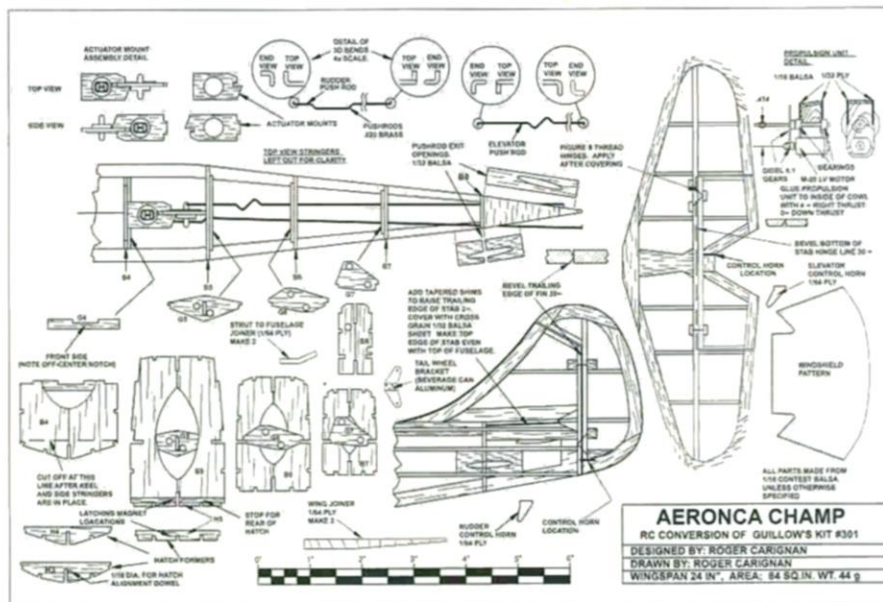
Follow the modified plan to cut out the fin, rudder, stabilizer and elevator parts. After covering the model, hinge the rudder and elevator with thread in a typical figure-8 pattern. Drill small holes at the positions shown, and then harden the end of the thread with glue so you won't need a needle. Secure the hinges with glue forced into the holes.

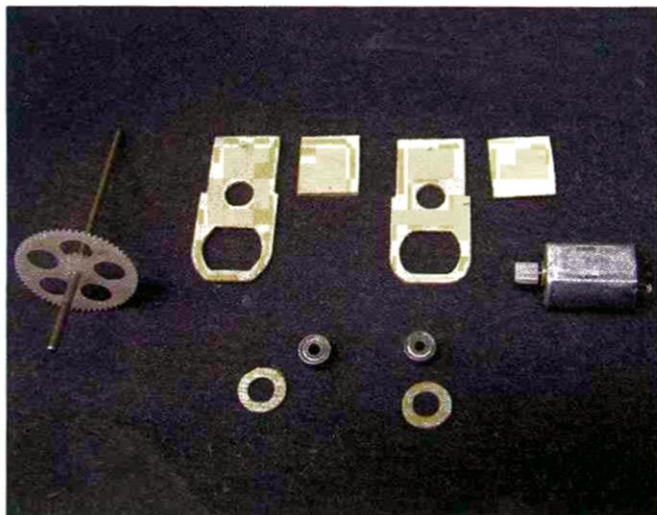
I built the wings per the kit plan, except that I added lightening holes in the trailing edge and tips. You could save more weight by making the ribs out of $\frac{1}{32}$ balsa and the trailing edge out of $\frac{1}{16}$ rather than the $\frac{3}{32}$ specified. Add $\frac{1}{32}$ balsa around the pockets

where the struts are attached so you'll be able to cover those areas. Install the $\frac{1}{64}$ ply wing joiners, and cut slots in the first three ribs on the forward side of the main spar. Install the $\frac{1}{64}$ ply joiners with the tapered side flush with the spar bottom. This will leave about 1 inch of joiner extending out of the wing root. Cut slots in the fuselage to allow these joiners to pass through. When you attach the wings to the fuselage, the joiners will overlap in the center, and you can glue them together.

Assemble the wing struts according to the kit plan. I made the struts functional, so I improved the way they're attached to the fuselage. Cut a $\frac{1}{64}$ slot at the junction of the struts, and glue the $\frac{1}{64}$ ply strut joiner into place. Cut a slot in the fuselage just aft of the landing gear and flush with B3 to accept the

I found that the plans were excellent, and the parts fit extremely well.





I made the propulsion unit with 1/32 ply. The gears are Didel 6:1. The shaft is 1.5mm, and the bearings are 5mm o.d. Use a Bob Selman Designs prop adapter.



Before covering the fuselage, check the fit of the cowl. Sand the fuselage around the nose if necessary.

strut joiner. Adjust the strut lengths to achieve 7/8-inch dihedral at the wingtips.

COVERING THE CHAMP

I used 5-micron RA Microlite covering from Homefly.com. The color scheme, although simple, is the classic yellow and orange used on many early Champs. I added the orange Microlite over the yellow and was surprised at how easy this was compared with my experience with other covering materials; the result was smooth and bubble-free. I would not hesitate to use this material for more elaborate color schemes and markings. Don't cover the bottom rear of the fuselage until you've installed the pushrods.

Remove some covering from the bottom of the stabilizer where it is attached to the fuselage to provide good gluing surfaces.

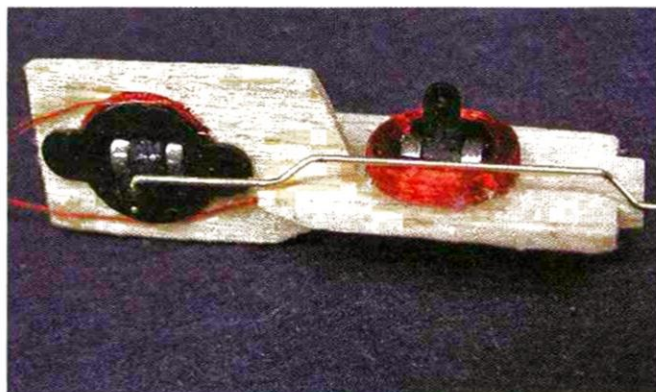
Apply the kit-supplied decals for the wing numbers and the instrument panel, and apply the Aeronca logo decal to the fin. To save weight, I did not use the bottom wing number.

I made the side windows by covering the window openings with Microlite and then removing the color/adhesive using a cotton swab dampened with acetone. Change the swabs often, and you'll have neat, very presentable side windows. Make the front windscreen out of the kit-supplied material, and attach it with 1/16-inch-wide strips of double-sided clear tape on the top and two sides. Apply a 3/32-inch-wide strip of vinyl tape where the windscreen meets the fuselage.

EQUIPMENT INSTALLATION

The modified plan shows the Bob Selman Designs MiniAct actuators. Make the two actuator mounts, and glue them together as shown, keeping them aligned. Install the actuators, and make sure that they are exactly as shown in the top and side views.

Make the 0.020-inch-diameter brass pushrods in the form shown in the modified plan, but do not form the aft 3D bends yet.



Build the actuator assembly before you install it in the model. Check to make sure that the pushrods move freely at this stage.

Make sure that the 3D bends are exactly as shown in the plan; if they aren't, the pushrods could accidentally decouple. Make the aft end 3D bends after you've connected the pushrods to the actuators and marked the rods for the proper length. When you install the pushrods, engage the actuator end, and then twist the pushrod 90 degrees clockwise to engage the control horn.

I made a propulsion unit using an M-20 low-voltage motor and a Didel 6:1 gear set. I made the gearbox out of 1/32 ply so that I could glue it inside the cowl. A GWS 5043 propeller matches this drive system well. I

colored the propeller with a black marker, as this looks better than orange for a scale model.

Position the receiver and battery to achieve a balance point on the forward edge of the main wing spar.

A scale pilot adds to the model's realism. I carved a pilot out of blue foam and glued it to a base made of 1/32-inch-thick sheet balsa between the fuselage stringers.

TEST FLIGHTS

My first flights revealed that the Champ was prone to tip-stalling and was overly sensitive to elevator control inputs. I checked the CG, and it was correct. I fixed the problem by reducing the propeller shaft's downthrust angle and making the elevator area smaller; then, the model flew as it should. The final configuration—including these changes—is shown in the plans.

Although this model is heavier than some of my other models of this size, the M-20 motor geared 6:1 provides a good power match.

Its rate of climb is good, and the model cruises easily with throttle backed off. The Champ can easily be flown in basketball-size gymnasiums and outdoors in a light breeze. In almost every flight session, you can expect to find spectators who recognize the model and tell stories of their experiences of flying (or flying in!) the Champ. ✦

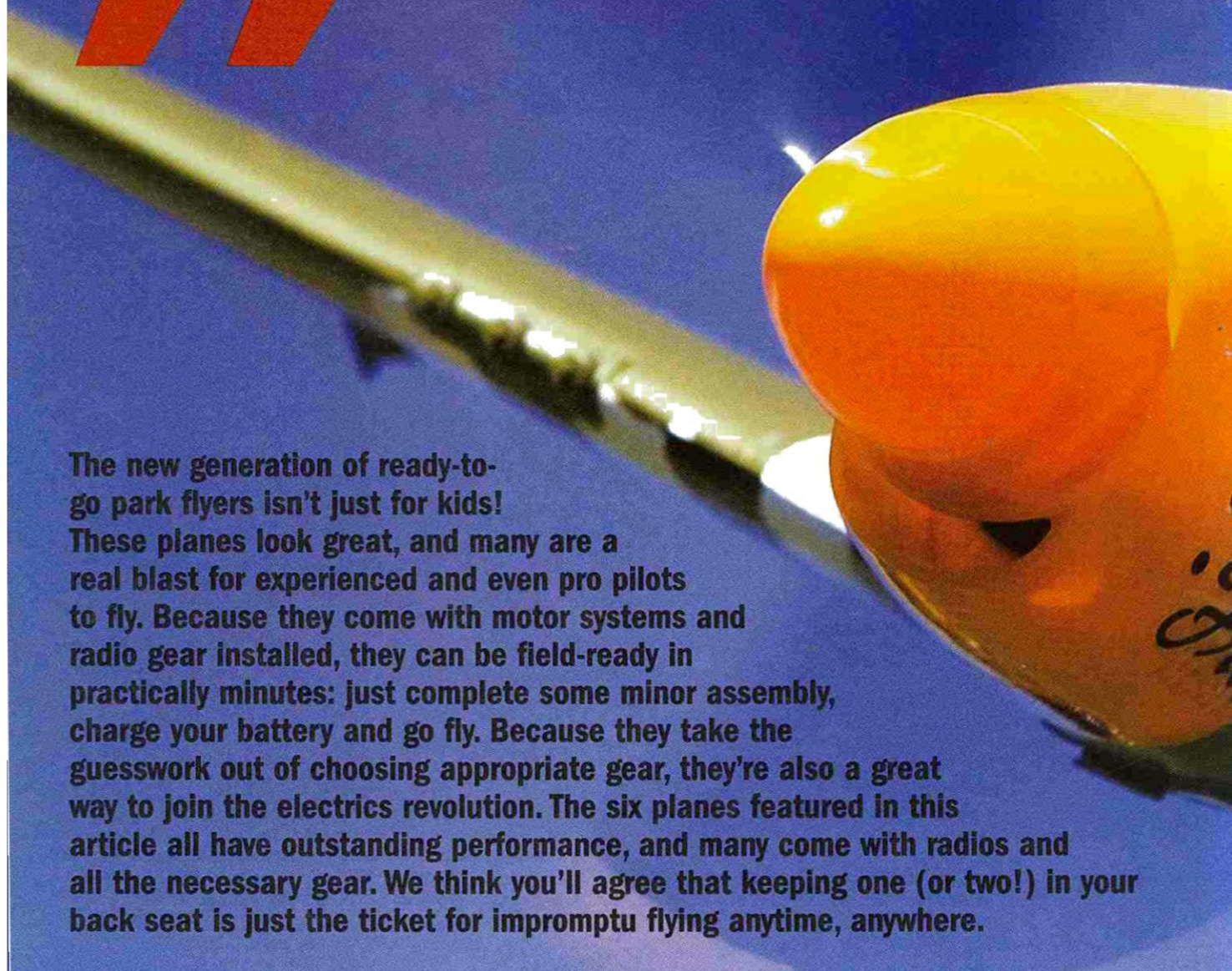
See the Source Guide on page 167 for manufacturers' contact information.



TO PRINT THE FULL-SIZE PLAN

THE Best

TOP 6 READY-TO-FLY ELECTRICS



The new generation of ready-to-go park flyers isn't just for kids! These planes look great, and many are a real blast for experienced and even pro pilots to fly. Because they come with motor systems and radio gear installed, they can be field-ready in practically minutes: just complete some minor assembly, charge your battery and go fly. Because they take the guesswork out of choosing appropriate gear, they're also a great way to join the electrics revolution. The six planes featured in this article all have outstanding performance, and many come with radios and all the necessary gear. We think you'll agree that keeping one (or two!) in your back seat is just the ticket for impromptu flying anytime, anywhere.

BY JOHN REID

PHOTOS BY PETE HALL, DERON NEBLETT & JOHN REID

OUT OF THE Box



[ScaleTechniques]

BY TOM POLAPINK || PHOTOS BY TOM POLAPINK & GERRY YARRISH



This 1/5-scale Pfalz D.III would look incomplete without that beautiful dummy Mercedes in-line 6-cylinder in its nose! You can make one just like it; it isn't difficult when you know the techniques.

SCALE ENGINES

REPLICATING THE FAMOUS WW I MERCEDES IN-LINE SIX

How many times have you walked the flight-line at a scale meet and drooled over the oh-so-real-looking dummy engines sitting in the noses of the competition models? Building such a scale dummy engine for yourself is not as difficult as you might think. Let's use the engine from my 1/5-scale Pfalz D.III as an example.

It's a 6-cylinder, 160hp Mercedes in-line engine, but these methods and techniques can be applied to replicate any similar dummy engine. I hope that once you learn how easy it really is, you will be inspired to use your own creativity and ingenuity to make your own.

There's no doubt about it: the addition of a dummy engine tremendously enhances a

scale model's appearance. It can even help to draw the eye away from any flaws in the airplane's finish or in the overall craftsmanship. To earn a good static score in scale competition, your model must include at least some visible engine detail if the full-size aircraft's outline includes it. With this technique, good results can be achieved with minimum effort. The fun part is that it feels as if you are doing



Here are the masters for the cylinder water jackets and rocker casings. The newly vacuum-formed plastic parts are to the right. They still need to be cut and trimmed.

an entirely different type of modeling, and it can serve as a welcome diversion from the model's other construction tasks.

It's difficult to specify which materials you'll need; you simply want the result to

look like the engine you're modeling. Use your creativity and whichever resources are available. I use leftover pieces from my workshop and find other materials at my local craft store and around the house. There are no rules; use your imagination.

A PROPER BEGINNING

Start with a good drawing of the engine. If you are building a 160 or 180hp Mercedes, you are in luck; Air Age Media's book "Scale Aircraft Drawings, Vol. 1, World War I" is available at rcstore.com. It contains William Wylam's detailed drawings of these engines. Copy and enlarge the drawings to the scale you need to match your model, and then lay the enlargements over your model's plan to check the new dummy engine's fit. You can also cut out the drawing components to use as templates while developing the shapes of the wooden patterns to make the built-up and vacuum-formed parts.

At first, the project may seem a bit overwhelming because so many little pieces go into making a first-class engine. Just remember that not every detail has to be duplicated. For flying models, all you need are the basic outlines and a few small, well-placed details that help to "sell" the overall illusion.

BE A COPYCAT

Break the engine down into its most basic and prominent shapes. The most outstanding elements of the Mercedes are its 6-cylinder water jackets, the camshaft/rocker casings, the intake manifolds, the rocker arms and valve springs and the exhaust. In the case of a multi-cylinder engine, you will have to make several duplicate components to assemble each of the cylinders and their associated parts. It is best to make each part once and then use it as a "master" to duplicate the remaining pieces. I made wooden forms and then duplicated the parts using a homemade vacuum-former. Another way to duplicate parts is to press your material into clay and then cast the copy pieces out of polyester or epoxy resin. This technique works equally well but does produce a slightly heavier engine. With short-nose WW I models, additional nose weight isn't usually a bad thing.



Dummy engines add tremendously to the overall scale appearance of any WW I model. It is definitely worth the extra effort to do it right.



Here, the jackets and casings have been trimmed to size. A completed top end is shown at right.



The circled area shows the metal strap I used to secure the dummy engine in place on my model. The front of the engine is glued to the glow engine with Zap-A-Dap-A-Goo.

Use whichever process you prefer.

A lathe is a big help when making cylindrical parts; that's what I used to make my hardwood water-jacket mold masters. I used 1 1/4-inch-diameter dowels turned downward to create the proper shape. I then cut the "water jacket" in half with a band saw and glued the halves to a piece of 1/4-inch plywood. I next drilled 0.031-inch-diameter holes around the perimeter of each part so that suction would pull the plastic tight around them.

I made the forms for the rocker casings out of a strip of hardwood. I shaped the strip along its top surface using a sanding block and then cut it into six short lengths to produce each rocker casing. I ended up with six nearly identical pieces, each with the same radius across the top. I then glued very short lengths of thin dowels to the four corners of each rocker casing to represent the bosses on

the full-scale casings. I next glued the rocker casings onto a piece of 1/4-inch plywood for vacuum-forming. After the casings had been vacuum-formed, the natural radius formed in the plastic material around each of the bosses made the finished parts look as if they were one-piece castings.

When you've assembled and glued all of your master parts onto a plywood base, you're ready to form the basic parts.

THE VACUUM-FORMER

Commercial vacuum-forming machines are available, but they're expensive. For more information about vacuum-forming, the book "Do It Yourself Vacuum-Forming for the Hobbyist," available from MicroMark (item no. 80868, \$14.95), is a big help.

You can make your own vacuum-former by building a square box frame using two pieces of smooth hardboard for the top and bottom. Drill 1/16-inch holes in the top surface in a 1-inch-square grid pattern; then seal all the seams and borders with silicone sealant. In one side of the box, cut a hole to fit the attachment of your wet-and-dry vacuum hose, and you'll be good to go. I made my vacuum-former 12 inches square.

To support the plastic sheeting, I made a layer frame that was larger than the box (14x14 inches) and allowed room to use small C-clamps around its edges. I cut a 7-inch-square window through the upper and lower frame pieces and applied thin foam tape to the perimeter of the box lid to allow the bottom frame plate to be sealed against it. I then sandwiched the plastic sheeting (0.040- to 0.060-inch-thick styrene) between the frame plates and clamped them tightly.

Place the frame and plastic in an oven that has been heated to 350 degrees F. When the plastic starts to droop, turn on the vacuum, remove the plastic and frame from the oven and carefully lay the plastic over your master parts. With practice, you will be on your way to making your own Mercedes engine kit.

BACK TO THE ENGINE

Cut and trim to size the formed-plastic water jackets, and glue the halves together using Pacer Plasti-Zap or Testors plastic cement.



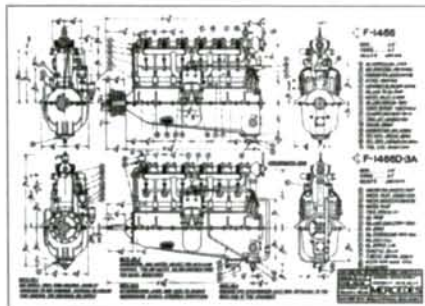
You can reinforce the seams on the inside using short strips of scrap plastic.

Drill a hole in the center of each of the bosses on the rocker casings from underneath; then inset snugly fitting 2-56 screws. Thread a 2-56 nut onto each screw stud where it protrudes through the casing, and secure the nuts with a dab of CA. The rocker casings can now be trimmed and assembled over a long styrene tube to represent the camshaft housing. All of the water jackets can be secured with tubes of a smaller diameter that represent the water-inlet tubes between the water jackets on the full-size engine. The idea here is to construct as many sub-assemblies as you can to form larger, easier to handle engine parts.

I made the intake manifolds out of balsa that I carved to shape and then wrapped with black, 1/4-inch-wide automotive pin-striping tape. After it has been carved and sanded to shape, coat the balsa with fiberglass resin to seal it; this gives the tape a smooth surface to stick to. On this particular engine, the exhaust tubes were simply straight pipes, so I used lengths of K&S aluminum tube to duplicate them.

To make the rocker arms on my model, I used ordinary wire-termination lugs right out of the toolbox. I secured the screws going through the terminal holes, and then I glued them to the rocker casings. To make the engine's valve springs, I found small-diameter springs (similar to those used in ballpoint pens) and cut them to length with a wire cutter. They aren't exactly scale, but from 5 feet away, they look pretty good. Unless you intend to compete at the World Scale Championships, all you need to do is create the illusion of scale.

If you don't have small items such as springs and lugs in your shop, you can find them for very little cost at a hardware store or through a specialty company such as McMaster-Carr (mcmaster.com).



A good drawing is the best place to start. This one is from the "Scale Aircraft Drawings, Vol. 1, World War I" book available from RCStore.com.



Zombie Painted Pilots: don't do it yourself!

The finishing touch for any scale model airplane is a nicely detailed pilot figure to occupy the main office. Many high-quality, molded pilot busts are available to choose from, but what if you don't want to paint and detail them yourself? Zombie Painted Pilots has the answer! Company owner Kevin Shaw supplies some of the best hand-painted pilot figures around. The one sitting in the Fokker Dr.I is a 3/4-scale WW I pilot from Aces of Iron. Kevin even details the goggles and makes great-looking lens inserts out of liquid resin (and you can have the goggles positioned up or down!). Kevin offers other pilot types, including those by Officers and Gentlemen and Cajun RC. Depending on the pilot's size and detail, Kevin charges anywhere from \$20 to \$50 to detail them. For more info on Zombie Painted Pilots, email Zombiebirdman@optonline.net, or call (631) 921-7071.

ENGINE INSTALLATION

Once you have the basic engine structure assembled, you have to remove portions of it to fit it around your model's glow engine and into your engine cowl. You must also install some hardpoints in the model to attach the engine securely in place. The attachment points will vary with each installation. On the Mercedes, I used a brass strap with two mounting holes drilled in it. I screwed and epoxied the strap to the rear of the engine and then used two screws to secure the strap to the airframe. I cut the front of the dummy engine so it rested neatly between the rocker-arm covers of my O.S. 1.20 FS engine. A few dabs of Zap-A-Dap-A-Goo hold the front of the dummy engine against the O.S. engine. It is important that your dummy engine be easy to remove to allow access to your engine, fuel tank and radio equipment.

Once the assembly is complete and the

dummy engine has been properly attached to the model, remove it and paint it. I simplified things by painting mine all black, but you can use other colors on the various parts. I also painted the valve covers on my model engine, and this helps them to blend nicely into the dummy engine.

FINAL THOUGHTS

These are just a few of the basic tasks you will need to do to create a really splendid dummy engine. Keep your eyes and mind open, and you'll see that it's very easy to come up with various simple ways to make the many detailed parts. Break the engine down into components, make the components, and then assemble and paint them. Even using the simplest forms—which may not be exactly scale—you'll be able to fill that empty space in your engine cowl! ✚

See the Source Guide on page 167 for manufacturers' contact information.

WHAT'S UP ON THE WEB?

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Feature: UAV Testing

Using the Seagull Wireless Flight System to prep for UAV ops

By RICK SILZ

The number and variety of unmanned aerial vehicles (UAVs) for research, commercial use and military applications is growing very fast. While larger U.S. military programs such as Predator, Global Hawk, Pioneer and Hunter are well known, there are literally dozens of small UAVs being developed for every conceivable purpose. Manufacturers of these smaller UAVs tend to want readily available, high-quality equipment that they can use to get vehicles into the air quickly, so they often use model plane power and radio systems, wheels, brakes, even linkages and hardware. For many reasons, the use of the latest turbine jet engines is on the rise, as they provide the same advantages as their full-size counterparts. I became involved with a UAV program after providing a requested flight demonstration with one of my turbine-powered jets. During the demo, we discussed a number of aspects of the program, and then they asked me to come on board as the project pilot. Read more about this top-secret project online!

Flight Test: Carl Goldberg Products Senior Falcon

The return of a sporty—and affordable!—alternative to the traditional high-wing trainer

By ROBERT REID

In the 1950s, Carl Goldberg produced the first Sr. Falcon. It was a 60-size model. Rarely do model aircraft stand the test of time as the Falcon has. In 1975, modelers Bob and Doris Rich made RC history by flying their Falcon 3,026 miles across the U.S. from Kitty Hawk, NC, to Oceanside, CA. For years, their model was on display at the National Air & Space Museum in Washington, D.C., before it was moved to the AMA museum, where it's proudly displayed.



played. Now, Carl Goldberg Products has brought back the history-making Sr. Falcon as a beautiful 46-size ARF. Check out the in-depth, online review to see whether this model does justice to its namesake.

How-To: Make a Microservo Mount

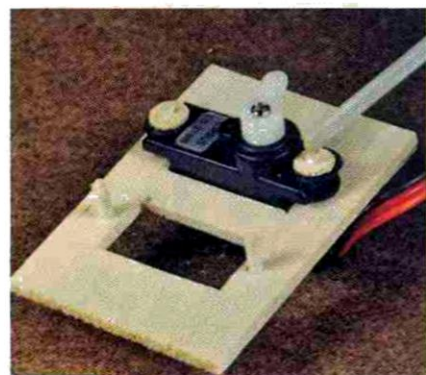
Easy, inexpensive tip for small models

By RANDY RANDOLPH

Editor's note: longtime contributor Randy Randolph passed away earlier this year. This easy, inexpensive how-to is emblematic of the types of articles Randy was so well-known and admired for.



Small, lightweight servos have captured the servo market for just about all RC airplanes that weigh 2 pounds or less, and they're the "only" servos for park flyers and indoor airplanes. The photos show how to use balsa in place of plywood and screws to mount these small powerhouses. Since eliminating weight is the idea of the smaller



servos, this system takes that idea one step further and is also an excellent way to mount servos in a profile fuselage. To use this method to mount larger servos, substitute 1/8-inch hardwood dowels and plywood mounts. This system works beautifully—especially where it's difficult to use screws. See the online article for step-by-step, photo-illustrated instructions.

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Download the full-size RC conversion plan



[Construction]

BY DAVID JOHNSON || PHOTOS BY DAVID JOHNSON & GERRY YARRISH



ALBATROS D.III

A giant-scale WW I biplane for scale competition

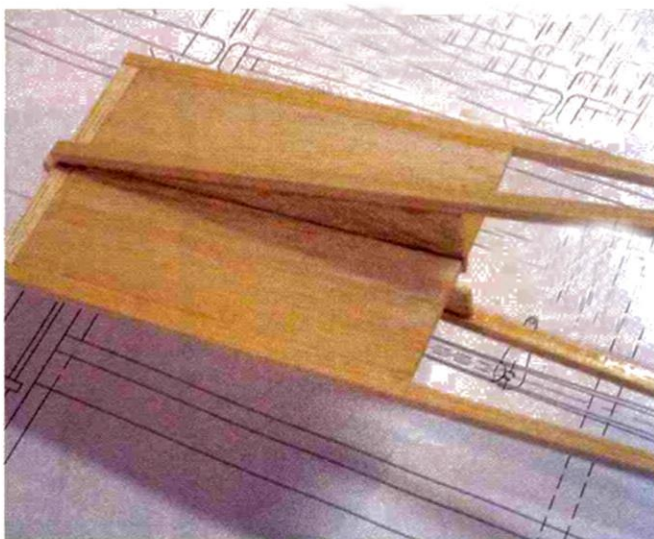
During WW I, Germany built more of the Albatros D series fighters than any other type of warbird. Though overshadowed by the Fokker D.VII and the Dr.I triplane, the Albatros was truly the workhorse of Germany's air service. Many famous aces such as Manfred von Richthofen, Werner Voss and Ernst Udet scored the vast majority of their victories while flying an Albatros. My construction subject is the D.III, which was introduced in 1917. The model is built to $\frac{1}{3}$ scale and is an excellent flyer that's capable of contest-winning scores, both static and in flight.

Specifications

MODEL: $\frac{1}{3}$ -scale Albatros D.III
TYPE: competition scale biplane
WINGSPANS: 118 in. (top), 112 in. (bottom)
LENGTH: 93.5 in.
WEIGHT: 35 lb.
TOTAL WING AREA: 3,316 sq. in.
WING LOADING: 24.28 oz./sq. ft.
ENGINE REQ'D: 3.5 to 4ci 2-stroke gas
ENGINE USED: Zenoah G-62
PROP USED: 28x8
REQUIRED: 4-channel (rudder, ailerons, throttle, elevator)
RADIO USED: Futaba 14MZ



The basic fuselage is built around this box structure. The box and formers are then strung onto a length of copper pipe for alignment, and the stringers are added.



Before the fuselage is sheathed, the aft tail-section structure is assembled and glued to the stringers as shown here.



The lower wing center section has been bolted to the fuselage.

FUSELAGE

The fuselage is the only aspect of the aircraft that presents a particular challenge. Begin by cutting a kit of parts and then construct the sides of the forward "box" section. Epoxy the $\frac{1}{8}$ -inch lite-ply front piece to the $\frac{1}{4}$ -inch main piece, and prop up the front end $1\frac{1}{16}$ inch above the work surface. Install formers F3 through F7, and make certain that F5H and F7H are exactly on the centerline, as these will align the entire structure. Then build the tail assembly out of F11 and two vertical balsa pieces.

Slide formers F8 through F10 and the box structure onto a straight piece of $\frac{3}{4}$ -inch copper pipe (available at any hardware store). Carefully align and position the formers in their correct locations so they are at right angles to the pipe; then install the top, bottom and side balsa stringers (spliced together to the proper lengths) and cut them off $20\frac{7}{8}$ inches behind F10. Install a $\frac{1}{4}$ -inch-square crosspiece between the two side stringers, and then install the aft tail section.

Install the remaining stringers, with the

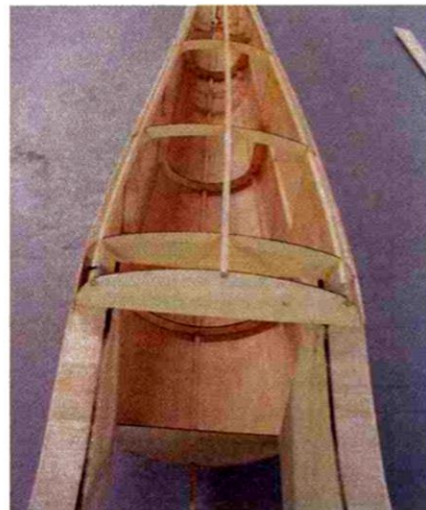
Designed by Dave Johnson, the $\frac{1}{3}$ -scale Albatros D.III is a great flying WW I biplane that isn't at all difficult to build. It is scale in outline, and the fuselage is fully sheathed. The model can be built fully detailed for serious scale competition, or you can build it for sport flying, as it has excellent flight characteristics.

last four ending directly on top of the two middle ones at the tail. Double the middle, side, top and bottom stringers with additional $\frac{1}{4}$ -inch-square balsa from F10 to the cross-piece. Find the stabilizer-spar locations, and drill $\frac{1}{4}$ -inch holes for them. Now install the mounting blocks for the cabane struts and front landing-gear struts. Fabricate the rear landing-gear attachments out of $\frac{1}{8} \times \frac{1}{2}$ -inch aluminum, and tap them for a 4-40 bolt. Install them on the outside of the box structure with the bolt heads on the inside for now. Remember to use thread-locker, as you don't want these to come loose. Sheet the

wing saddle now, and note that the sides come straight down to the seat and will be faired in by the fillets when the fuselage is finished. One last time, make sure that all the formers are square, and it will be time to start sheeting.

I used $\frac{1}{8} \times 6 \times 48$ -inch balsa sheets from Trillium Balsa for this task. Begin by sheeting from F10 forward, and go as far as you can from the middle stringer upward (be careful not to twist the structure). Trim this panel along the top stringer. If you plan to stain the fuselage, you must avoid getting glue on the outer surfaces. Now sheet from the bottom of the middle stringer downward, and work forward from F10. Complete the sheeting on the top from F10 forward to the former in front of the cockpit. If you dampen the outside of the balsa with a little water, it will help it go around the corners without cracking.

Go back and sheet the sides and tops from F10 back. Keep in mind that this area changes



Here, the fuselage has been partially sheathed and slid off of the alignment pipe.

from a smooth radius to a right angle. Install the rudder tiller as shown on the plans, and install the pull-pull guide tubes from F10 back. Now add a Nyrod tube from the rudder tiller to an area under the wing saddle. Remove the tube, and finish sheeting the bottom of the fuselage. Then bend and install your cabane struts and landing gear. The 1/2-scale wheels are from Balsa USA. We'll return to the fuselage and cowl later.



Here, the wings are being attached and aligned with the fuselage.



This is the rudder tiller arm. It is built into the fuselage before it is completely sheeted.



The tail surfaces are attached permanently to the fuselage. The outline is laminated with several strips of balsa.

TAIL SURFACES

Laminate the outlines using eight layers of 1/16-inch balsa. I hammered nails into a sheet of plywood every 1/4 inch around the inside outline and made the laminations using carpenter's glue. Sheet the vertical top and subfins as shown on the plans, and make sure



PHOTO BY TOM POLAPINK

Lethal Wooden Wonder

Let's try to put the Albatros-Flugzeugwerke series of WW I fighters into perspective. The Wrights flew in 1903, but they didn't reveal many of their secrets to the world until 1905. And it was closer to 1908 or 1910 when Glenn Curtiss jumped into the game with ailerons, elevators and all that other "real" airplane stuff.

Now flash ahead to 1916: the Albatros D.III was introduced to combat carrying a pair of Spandau machine guns and capable of flying at more than 105mph. Only about 10 years separated "airplane, the entertaining but useless kite" from "airplane, the highly efficient killing machine." The technological progress during that period was absolutely amazing.

A frenzy of airplane design and construction was then under way in Europe. Tony Fokker is credited with conceptualizing the steel-tube truss fuselage. Junkers came up with the clunky corrugated-aluminum designs that set the stage for stressed-skin aluminum structures. Albatros, along with Pfalz and a few others, steered away from the "sticks and wire" wooden fuselage trusses of the Sopwiths and Nieuports and instead developed its own versions of stressed-skin, semi-monocoque construction.

Although the wings of an Albatros are traditional biplane fare—wooden ribs stacked on wooden spars, with the entire mess braced by miles of wire—the fuselage is really intriguing because it owes more to boat building than to aeronautical engineering.

The Albatros's fuselage was a thin skin of what we call plywood today, although the word hadn't yet been invented. Unlike Pfalz and Roland, which used male molds, Albatros formed its skins in female molds, probably by laying relatively narrow strips of steamed veneer into the mold, with each successive layer running at an angle to the one before. Three layers were formed, and when the glue had dried, a rigid, compound curved skin—not unlike that of a boat—was the result.

The four skins (top, bottom, right and left) carried most of the fuselage loads and were attached to the frames with screws, nails and glue. The edges of each skin overlapped in a smooth, wide scarf joint. The end product was an extremely rigid, light structure that was as streamlined as an airplane could be at that time—although it must have been tough to repair.

With the D.III, Albatros broke from its earlier designs by replacing the full-size bottom wing with a much narrower one, thereby creating what was almost a sesqui-plane. This allowed the use of a single V-strut at the tip, rather than the drag-producing N-struts of earlier designs.

Although greatly overshadowed by later, more glamorous aircraft such as the Fokker D.VII and the SE5a, the lowly D.III was actually one of the earliest and greatest ace-makers. For instance, nearly two-thirds of Richthofen's 80 kills (21 in April 1917 alone) were in an Albatros D.III, and it was a red-painted Albatros that gave him the "Red Baron" identity—not a Fokker Triplane. In fact, the colorful paint jobs of the Albatroses in his Jagdgeschwader are where the term "flying circus" supposedly originated.

The craftsmanship of the Albatros was akin to that of fine furniture, but even the finest furniture won't survive outdoors. Only two original examples remain: one in Australia, the other in the Smithsonian. They will, however, live forever in the minds of modelers.

—Budd Davisson

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The dummy Mercedes engine covers the Zenoah G-62 nicely. The engine cowl has yet to be fitted into place.

that they are square to the bottom wing saddle. Install the $\frac{1}{4}$ -inch brass tube through the fuselage, and trial-fit your horizontal stabilizer halves at this time. If they are not 90 degrees to the vertical stabilizer, adjust the tube holes until they are. They should be a close fit to the fuselage side, but if they aren't, build them up and sand them. When you're satisfied with the fit, set them aside until later.

WINGS

The wings are constructed conventionally; only the spars require special attention. They are built out of $\frac{1}{4}$ -inch-square basswood as one-piece boxes with $\frac{3}{32}$ -inch balsa sides. Cut the sides and then lay the $\frac{1}{4}$ -inch basswood strips (spliced with a scarf joint) along the top and bottom edges to form an open box. Beginning at the center, put a vertical $\frac{1}{4}$ -inch-square basswood piece every 12 inches. Sheet the open face, and you'll be done.

Place the ribs, and then add the leading edge. Add the leading-edge sheeting as shown on the plans. I found it easiest to build the ailerons in place and then cut them out. I laminated the top wing center-section cutout in place and then sanded it to shape. Add the capstrips, and you will essentially be finished.

Bolt your lower wing into place, and prop the fuselage up until the wing is at 0 degree incidence. Set the top wing on your cabane struts, and make sure that it matches. Carefully align the wings so they are parallel, and mark the locations for the top wing-attachment bolts. Add blind nuts and install the aileron servos. To control the ailerons, I ran spoiler-type linkages between the double ribs at the strut locations. A better solution for a sport aircraft would be to install the



The completed dummy engine and engine cowl look very scale. Functional vents aid engine cooling.



Competition with the Albatros

Dave Johnson has been building and flying scale WW I models for 30 years, and he has published several designs in *Model Airplane News*. Dave is now a senior manager at Hobbico, and he flies at several scale events every year. So far, the Albatros D.III has earned Dave a first place at the Mint Julep scale meet, and it has finished as high as fifth at Top Gun and second at the AMA Nationals.



The ailerons use strap hinges, and the large slot in the wing is for the scale-like aileron control-horn linkage.

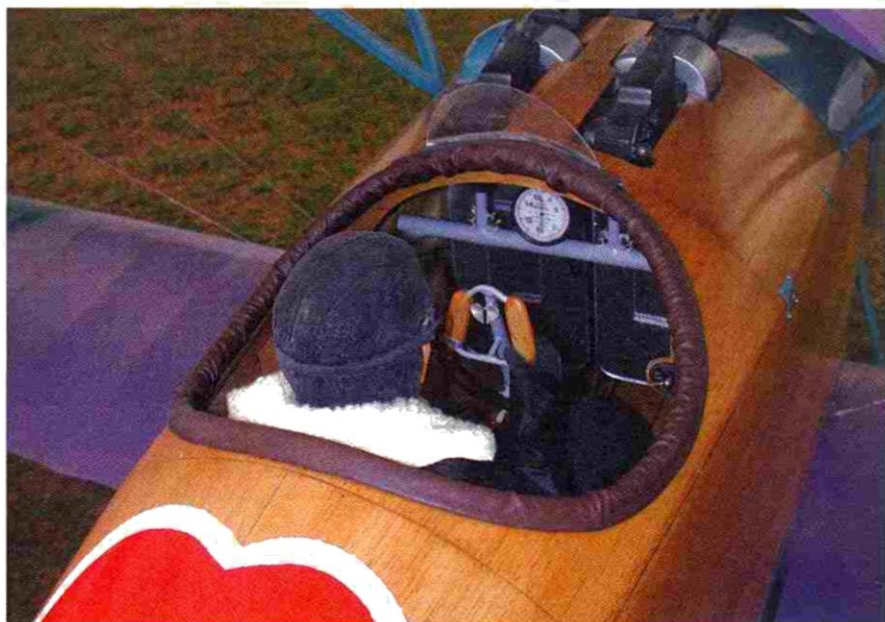


Completed tail surfaces are very scale-like and use pull-pull elevator cables.

servos with the arms exposed and use a standard 4-40 pushrod linkage. If you use the spoiler-type approach, use servos with metal gears! For covering, I used Sig Koverall and finished the wings with Sig Dope. Now, let's go back to the cowl.

COWL AND FUSELAGE

First, install your engine in the cowl. I used a Zenoah G-62, and I built a box with 1/4-inch



Detailed inside and out, the Albatros has a complete cockpit interior and a pilot figure.

plywood to position the engine correctly. Then I bolted on the spinner and spinner backplate (from Arizona Model Aircrafters) with former F1 glued behind it and with a 1/16-inch spacer separating it from the backplate. Build up the forward part of the cowl with 1/8-inch balsa, and sand it to blend into the fuselage. I used Bondo automotive filler to fill low spots, and then I glassed it with 0.5-ounce fiberglass cloth. I formed the top panels and side vents out of aluminum roof flashing. To improve engine cooling, I opened the vents to make them functional.

Apply the fuselage stain, and allow it to dry for at least a week before you seal the wood. Install your fuel tank and servos,

then finish painting and add any scale details you like.

FLYING

This is the fun part! Make sure that the CG is as shown on the plans, and go fly.

Set up your controls as follows:

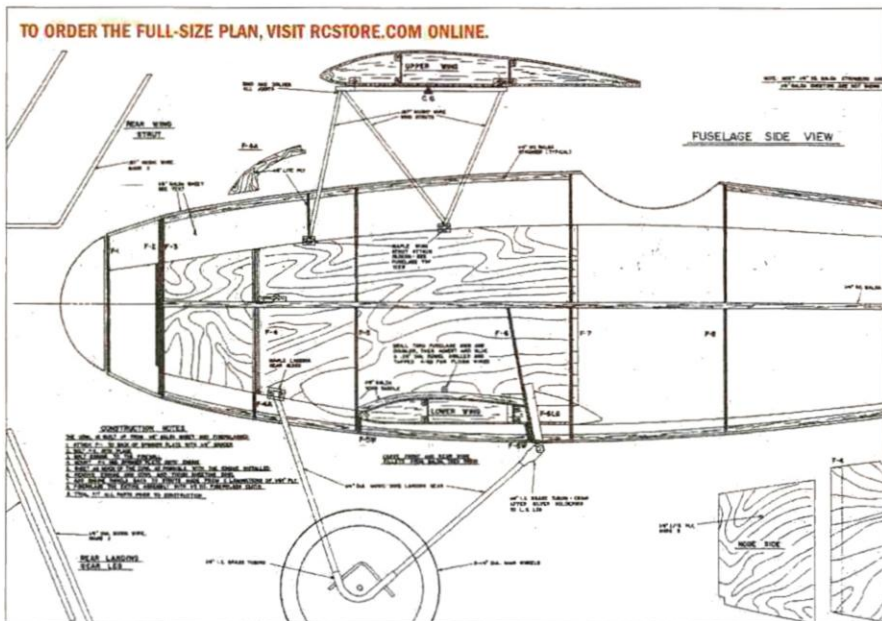
- **Ailerons:** 2 inches up, 1 1/2 inches down
- **Elevator:** 3 inches up, 1 1/2 inches down
- **Rudder:** as much as you can get without binding (up to 45 degrees left and right).

Begin your takeoff roll by gently applying the throttle. With its scale tailskid, the plane tracks pretty well on both grass and pavement; just stay on the rudder. When the tail comes up, the plane is ready to break ground on its own and requires about 3/4 throttle on a calm day. The plane is very stable and relatively easy to fly. It will do most standard maneuvers such as loops, stall turns, etc. Couple rudder with aileron to make smooth turns.

On landing, simply throttle back, add a little forward stick, and the plane will settle nicely into the landing pattern. As you get a couple of feet from the ground, slowly keep feeding in up-elevator, and the Albatros will settle into a nice, 3-point landing. Again, stay on the rudder until the model comes to a stop.

For scale competition or for some serious sport flying fun, I think you will like the way the D.III performs. It is fairly easy to build and flies beautifully. Have fun! ✈

See the Source Guide on page 167 for manufacturers' contact information.



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[Final Approach]

TEXT & PHOTOS BY JOHN REID



HIGH-END SCALE DETAIL Super Sabre F-100F

At any scale event, there's always a plane that stands out, and this beautifully detailed Super Sabre F-100F is such a plane. Owned by David Soufer and flown by John Redman, the highly detailed jet was painstakingly constructed in 18 months by builder Greg Anixter. At a recent jet rally, the Super Sabre's magnificent scale detail drew admiring crowds all day.

This F-100F started out as a Bob Violett Models (BVM) kit, but after Greg had logged 1,200 to 1,300 hours on its detailing, it evolved into something well beyond a standard kit. Among Greg's painstaking details are panel lines, 40,000 simulated rivets, 7,000 "screw heads," a fully detailed cockpit, a workable cockpit canopy, retractable landing lights, a working drag chute and a tailhook that deploys with the landing gear.

Specifications

MODEL: Super Sabre F-100F

MANUFACTURER: Bob Violett Models

WINGSPAN: 69 in.

WING AREA: 1,200 sq. in.

WEIGHT (DRY): 44 lb.

WING LOADING: 84.5 oz./sq. ft.

LENGTH: 90 in.

ENGINE USED: Olympus Netherlands turbine

RADIO USED: JR 10X w/945S receiver, 17 JR servos, 4 JR Matchboxes

The plane is covered entirely with individually applied, 0.0015-inch-thick, stick-on, aluminum-sheet panels from Flite-Metal. To add to the plane's realistic looks, each panel was individually finished. The painted and detailed panels add about 3 pounds to the overall weight. The exhaust nozzle is unique to this plane; it was ordered from Texan Dan Gill, as were the bombs. The missiles, drop tank and pylons came from BVM.

According to pilot John Redman, the Super Sabre F-100F flies very well. It can fly all the maneuvers the full-size plane does—and more. It weighs 44 pounds dry, and with the addition of 165 ounces of jet fuel, its total take-off weight is a little more than 54 pounds. Once airborne,

the Olympus Netherlands turbine burns 26 or 27 ounces of fuel per minute at full throttle.

Even at a jet event where every plane displays marvelous craftsmanship, David Soufer's Super Sabre F-100F is truly a standout. It has the outstanding flight characteristics for which turbine jets are known, and it serves as a testament to the dedication and skill of a master builder. ✦



Top: scale details such as this hook-on ladder are evident everywhere on the F-100F. Above left: the exhaust nozzle is unique to this plane; it's a detail that will challenge any scale builder. Above right: just some of the inner workings that keep the Super Sabre airborne.